

A
Practical Essay
ON
DISEASES AND INJURIES
OF THE
BLADDER,

Being that to which the Royal College of Surgeons adjudged the
Jacksonian Prize for the Year 1821 :

IRRITABLE BLADDER IS TREATED OF IN ALL ITS VARIETIES, BOTH WITH
AND WITHOUT MUCOUS DISCHARGES ; ALSO INFLAMMATION,
SUPPURATION, AND ULCERATION OF THAT ORGAN ; WITH

Cancer and Stone,

The Formation . . . which last is explained on entirely
New Principles :

RETENTION AND INCONTINENCE OF URINE

Are considered very fully ;

AND THE WHOLE IS PREFACED BY AN INQUIRY INTO THE MUTUAL INFLUENCE
THAT EXISTS BETWEEN

Life and Organization ;

INCLUDING SOME OBSERVATIONS ON OCULAR SPECTRA
AND THE NATURE OF MIND.

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OF THE TESTES, &c. &c. ;
AND LECTURER ON THE THEORY AND PRACTICE OF SURGERY.

" Every man should aim to do one thing well.—*Cecil's Remains.*"
" What now thinks shall continue to think on for ever.—*Johnson's Rasselas.*"
" It is by following Nature that we learn to command her."

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TO
SIR WILLIAM BLIZARD, F.R.S.,
PRESIDENT OF THE ROYAL COLLEGE OF
SURGEONS IN LONDON, &c. &c.,

WHOSE professional talents, liberal sentiments, and zeal for the improvement of the Art and Science of Surgery, have combined to raise him to the head of his profession, and to make him one of its most distinguished ornaments, the present pages are inscribed as a tribute of unfeigned respect by his

Obedient humble Servant,

ROBERT BINGHAM.

12, *Golden Square,*
Sept. 9th, 1822.

AN
INQUIRY,
INTO
THE INFLUENCE THAT EXISTS BETWEEN
LIFE AND ORGANIZATION.

HAVING in the Preface to my Practical Essays on Strictures of the Urethra, &c., refuted the doctrine that life results from organization, by proving organization to be the effect of pre-existent life acting upon unorganized matter ; I shall, on this occasion, institute an inquiry into the mutual influence which they exert over each other, and shall begin by considering the function of secretion.

The term secretion literally means no-

thing more than the act of separation—or a separated fluid ; but when applied to the formation of the fluids peculiar to animal bodies, it must be understood as having a much more extensive signification. All the secretions are formed out of the blood, but many of them are so totally different from every thing known to exist in that fluid, that they seem to be almost new creations, consequently the process by which they are formed must have something more concerned in it than mere mechanical separation—to effect such very great changes as take place in the formation of many of the secretions, there must be a chemical power concerned.

Different secretions are accomplished in organs possessing different kinds of organization, and every different secretion seems to have one peculiar kind of organization

appropriated to it. From knowing this, we might, upon taking a superficial view of the subject, be led to infer that organization was the sole agent in effecting the secretion of animal fluids ; but as already observed, there must be some other agent, and that a chemical one ; because organization can only operate mechanically, it cannot separate from the blood that which does not previously exist in it, and many of the secretions are known to possess properties which cannot be detected in the blood.

Allowing then the utmost that we can to the effects of organization, it cannot be more than this, viz., that different kinds of organization are necessary to effect different secretions by exposing the blood to the action of a chemical power under different circumstances, whereby the same power pro-

duces different results ; but even this is allowing too much to organization, because then so long as the blood was the same, and the organization was the same, we should always have the same kind of secretion which is very well known not to be the case.

Difference of organization, therefore, can only be for the purpose of avoiding any unnecessary expenditure of power, by exposing the blood to the influence of a chemical agent, under the most favourable circumstances for effecting each peculiar secretion ;—for the arteries, veins, excretory ducts and absorbents, in the abstract, are mere mechanical tubes—they can only answer as conduits to such fluids as they may happen to contain—they have no power to impart any fresh properties to those fluids, neither can they change

the qualities which already belong to them.

The arteries supply the blood from which the secretion is to be formed, and the veins carry the remaining blood back again after secretion has taken place; the excretory ducts receive the secreted fluid, and while it remains in these ducts, the absorbents act upon it so far as is necessary to make it possess a proper degree of consistence. But further than this the arteries, veins, excretory ducts, and absorbents, are nowise concerned in the functions of secretion. There is, however, another part of organization, the nerves, which have not been mentioned, and which appear to be very greatly concerned in the function of secretion; for, notwithstanding a secretory organ may be perfect in all other parts of its organization, and the circulation of blood through

it may go on properly, yet if the nerves be in a state of irritation, this materially affects the quantity and properties of the secretion, and so far as it is possible to divide all the nerves leading to a secretory organ, (although that be done at a considerable distance from it), the operation seems in the same proportion to put a stop to any further secretion*, which proves the nerves to

* I am disposed to think that the nerves interfere with some kinds of secretions much more than with others ; and I apprehend this happens in proportion as the secretions differ more or less from the blood out of which they are formed ; because life seems to produce all its partial and peculiar effects chiefly through the medium of the nerves. Allowing this to be correct, it would lead us to expect, that, dividing the nerves going to a secretory organ, would influence the properties of the secretion more than the quantity of it. This, however, is a point which never can be accurately decided by actual experiment ; for there is no part of the body which can have its nervous communications with the rest of the system entirely destroyed. The division of the par vagum, on both sides of the neck, has been found to have various degrees* of effect upon the secretions of the stomach ; some-

be very greatly concerned in the exercise of that function. The division of the nerves at a considerable distance from the secretory organ, cannot change the organization of the nerves in the organ ; therefore, the influence which the nerves appear to have over the function of secretion, cannot be owing to any thing peculiar in their mechanical structure, but must be the effect of some principle being imparted to the organ through their medium, and the operation of dividing them prevents further secretion by cutting off the supply of that which is the essential cause of its

times it has produced more, and sometimes less effect, than might have been expected : but, taking the various results in the aggregate, I think they warrant the conclusion that secretion is prevented in the same proportion as the nervous influence is cut off. It is, however, quite sufficient for our present purpose, if we can determine the nature of the influence which the nerves appear to exert over secretion, because the present inquiry only extends to the mutual influence which exists between life and organization in general.

taking place, which cause may be termed the nervous fluid, or life.

It cannot be denied that the secretions often vary greatly and suddenly, without any alteration occurring either in the organization of the secreting organ, or in the blood which circulates in it. This variation in the secretions, under these circumstances, can only be accounted for by supposing some difference in the nervous fluid, which has already been shewn to be the efficient cause of secretion; and the difference in the nervous fluid must either be some actual change in the very nature of it, whereby it becomes altogether a different cause, or else the nervous fluid remains the same, and only changes its *modus operandi*, whereby it produces different results.

There can be no doubt that the latter

is the real state of the case, because the nerves belonging to any of the five senses, are, during health, always capable of conveying different impressions to the mind, in such very rapid succession, that we must believe these impressions to be the result of different operations of the nervous fluid, in the extremities of those nerves. The different operations of the nervous fluid, or life, in the extremities of the nerves, are termed Nervous Actions: we will now, therefore, investigate how far they are the effect of organization; and as the actions which take place in the retina admit of the clearest discrimination in language, they are the best that can be chosen for our present purpose.

Every part of the eye, anterior to the expansion of the optic nerve, serves no other purpose that we know of but to convey the image of the object which is to be per-

ceived clearly and perfectly down to the retina—it is, therefore, in the retina that those actions commence which constitute sight.

By the eye we can discern nothing more than the shape and colour of objects. The shape of an object is known by its being presented to certain parts only of the retina, so that the power of vision resolves itself simply into the discernment of colours.

It is observable, that, if we view a coloured object steadily, till the eyes become fatigued, and then either shut our eyes or turn them to look on a white surface, we appear to see an object of exactly the same shape as that we have viewed, but of quite an opposite colour. Thus, if we have been attentively regarding a red spectrum, on closing our eyes a green

spectrum will appear, green being the opposite colour to red. The reverse spectrum of blue is orange, and the reverse of yellow is indigo.

If the sun be steadily viewed for a few moments, and then the eyes be closed, a dark spot will appear of precisely the same size and shape of the sun; a black spectrum being the reverse of white, which the sun itself exhibits.

If the eyes be steadily directed towards the coloured object long enough to fatigue them extremely, the opposite or reverse spectrum will be presented to the imagination, the object still before the eyes seeming to change its colour: thus, a blue object will appear to become orange-coloured, &c.

When the eyes are removed from the

object, the reverse spectrum continues to be seen for a longer or shorter period, just in proportion to the time they have previously dwelt upon the real spectrum ; and, as the effect goes off, the colours of the spectrum, first alternate between the real and reverse, then disappear and re-appear several times, growing fainter and fainter, till at length the spectrum vanishes entirely.

Thus it seems, that after the organ of vision becomes fatigued by one kind of action, it spontaneously seeks relief by falling into the opposite kind.

A sharp blow on the eye causes the same actions to take place in the retina, as those which result from seeing a flash of lightning; and if either angle of the eye be pressed with a finger, it produces the appearance of a luminous circle at the opposite angle,

From these experiments it has been justly inferred, “ that the spectra in the eye are not owing to the mechanical impulse of light impressed on the retina, nor of its chemical combination with that organ, nor to the absorption and emission of light, as is observed in many bodies ; for in all these cases the spectra must either remain uniformly, or gradually diminish ; and neither their alternate presence and evanescence, nor the change of colours, nor the flash of light, could exist.”

The ingenious Dr. Darwin supposes, that the spontaneous changes which take place in the spectra, when the retina is fatigued, evince the perception of colours to be the effect of muscular actions * in

* See *Darwin's Zoonomia*, Vol. I., p. 341. He writes, “ It is not absurd to conceive that the retina may be stimulated into *motion*, as well as the red and white muscles which form our limbs and vessels.” And, at page 569, he asks,

the retina ; but this cannot be nearer the truth than any of those theories to which he has previously objected ; for if the perception of colours results from motions in the retina, we must conclude that every different colour that is presented to the eye produces a corresponding different motion. Now, as the eye can perceive a variety of colours, and as we must believe that every single fibre of the retina possesses the same variety of power as what belongs to the whole, and as there are but two motions in muscular action, that can account for the perception of no more than two colours ; consequently, muscular

“ May not *muscular fibres* exist in the retina for this purpose, which may be less minute than the locomotive muscles of microscopic animals ? May not *these muscular actions of the retina* constitute the sensation of light and colours ?” And, at page 576, he remarks, “ We have before observed, that the changes of these colours remaining in the eye, evince them to be motions of the fine terminations of the retina, and not impressions on it.”

actions in the retina cannot be the ultimate effect of light impinging on that organ. A similar objection lies against their necessary existence as an intermediate effect, because we cannot believe that muscular actions are necessary to the production of any one spectrum, without their being equally necessary to the production of every spectrum which can be presented to the imagination : and supposing that to be the case, then they will no longer serve to explain the spontaneous alternations of the retina, between the colours of the primitive or true spectrum and those of the reverse. And they cannot be the primary effect of light impinging on the retina, because, if muscular actions take place at all, they themselves must result from some previous operation in the living principle, which must be excited before it can move the fibres of the retina. We have, therefore, from considering *these experiments alone*,

no just ground for thinking that muscular actions take place in the fibres of the retina under any circumstances. I apprehend, that if vision results in any degree from any kind of simple motion, it must be the effect of life itself moving in the retina ; but this will be more fully discussed in the sequel.

From reflecting upon those luminous appearances which have been mentioned as resulting from the momentary application of pressure to the eye, I became anxious to know the effect of a similar stimulus long continued ; because, if the use of such means would produce any variety of actions by continuing them at will, when nothing else could act upon the retina, it promised to afford me the best possible opportunity for observation. I therefore lay back on a sofa, closed my eyes, and pressed firmly upon the centre

of each with the point of my finger during a period of about ten minutes, in which time I was agreeably surprised by seeing the following beautiful spectra : At first, there was nothing but darkness perceptible ; this, however, gradually gave way to a fiery red colour equal in extent to the previous darkness. The red colour was not however all of one shade, but seemed to be a light red ground marked all over with red spots of a deeper hue, which varied their shape, being sometimes square and sometimes round, and some of these red spots were of a deeper colour than others.

All the red spots were arranged in exact order at equal distances ; and the deepest coloured red spots were in square patches, and these square patches seemed to meet each other at the corners, and were equal in number with the intervening lighter red squares. Every part of

this spectrum was affected with a constant, but otherwise indescribable, motion ; indeed, the nature of the motion seemed to be perpetually varying. Sometimes it might be compared to the motion seen on the surface of a fluid slightly effervescing ; at other times there appeared to be different kinds of motion in different parts of the spectrum, and these different parts seemed to ebb and flow to and from each other—one receding as the other gained upon it. Sometimes there was a waving motion extending in circles from the centre out towards the circumference, exactly similar to those seen on the surface of water after throwing in a stone. All parts of the spectrum were constantly varying in brilliancy, just as figures are seen to do in the phantasmagoria, when their apparent distance is made to vary, only the darker and lighter parts of it always maintained the same size and the same relative depth of colouring.

Beside the varying motions already mentioned, I sometimes observed vibrations of white light, which began in the centre, and passed off in circles to the circumference following each other in very rapid succession. After a time, a round yellow spot, about half an inch in diameter, appeared in the centre of this red spectrum, and the yellow part gradually became of a deeper and deeper colour, and great variety of rapid motion was observable in all parts of it. Sometimes extremely brilliant streaks of white light were seen somewhat radiating from the centre of the yellow part, and these white streaks kept vanishing and re-appearing almost every instant. The intensity of the yellow colour was perpetually varying, and after a while the centre of it appeared growing dark, and in a little more time the dark part could be seen to be constituted of very deep red and blue colours disposed in short lines, that were curved

and crossed each other in all directions ; and similar dark red and blue lines were observable in all parts surrounding the yellow ring, which was then all that remained of the yellow spot. Waiting a little longer, all that part which had once been yellow turned gradually white, being of a more brilliant white in some parts than others, and the whole of it seemed affected with a sort of boiling motion. All the surrounding part of the spectrum turned darker and darker till nearly of a chocolate red, with apparently such a mixture of white as just prevented it being one uniform colour. In a little more time the white centre gradually disappeared, and then innumerable spots of white light were seen moving in all directions, and these afterwards gave way to crooked streams of white light, each one of which seemed to follow the same course that a white spot had done previously ;

but as great numbers of them traversed the centre, or very near to it, they altogether presented a somewhat radiated appearance. In every one of these white streams I could distinctly perceive the same kind of curling motion as that which always attends large columns of smoke.

In this state the spectrum remained for a short period, and then slowly became less and less vivid; the streams of white light grew fainter and fainter, and the chocolate red-coloured part turned darker and darker till scarcely any light was perceptible, but distinct motion continued to be seen in all parts of the spectrum to the last moment of my observing it.

¹²⁸ I have made this experiment repeatedly on the same day, and on different days,

and for the most part the spectrum, was such as I have described ; in all the experiments made in the course of one evening, but it should be mentioned, that I seldom obtained precisely the same result twice, and never on different days, and the following are some remarkable peculiarities that appear to me worthy of notice.

Sometimes the small red spots*, instead of being round or square, were oval, and instead of being all at equal distances, were arranged in small clusters—four uniting in every cluster, and altogether appear-

* The red spots have so invariably appeared in *the beginning of every experiment*, and have at that period so uniformly been distributed in exact order in all parts of the spectrum, that it suggests whether or not pressure might not be usefully employed in some diseases of the eye to determine the state of the retina. Very probably an experiment of this kind might enable us to decide when squinting proceeds from habit, and when from some imperfection in the terminations of the optic nerve.

ing like so many small red flowers, each having four petals.

One evening when the experiment was repeated thrice, the yellow part of the spectrum having remained stationary for about a minute of one clear colour, a mixture of green came in its circumference, and gradually disappeared towards the centre, where nothing but yellow could be seen. Now and then the green part changed to an orange colour, but the latter never appeared to extend so far in towards the yellow centre as the green did; but this probably resulted from my want of greater discrimination, because there is more similarity between yellow and orange than there is between yellow and green. Sometimes orange appeared without the whole of the green disappearing, and then there was a circle of faint green intervened between the orange and yellow, and all

three occupied no more space than the yellow alone had done previously. The green and orange, both of them partook very much of the yellow, and the change from one of these two colours to the other, was as sudden as can possibly be imagined—every part of the circle changed at the same instant.

It is also remarkable, that in each of these three experiments, instead of the yellow part of the spectrum ultimately turning white, as it always had done in former experiments, the whole spectrum, about the time that I expected this change to happen, assumed a fiery appearance, having round or oval red spots of a much deeper hue, placed in exact order, and at equal distances in all parts, and beside these red spots there were others of the deepest and most brilliant blue colour imaginable. The blue spots twinkled as the stars are seen to do

in a clear night, and were perpetually varying their shape from a square to an irregularly angular-pointed figure. The blue spots were arranged in the most exact order at equal distances, and seemed to divide the red surface into perfect squares all equal in size—a blue spot being placed at every corner of a red square, and nowhere else but at the corners, and every one of these squares contained about sixteen of the before-mentioned dark red spots.

In all the foregoing experiments, the three primitive colours, red, blue, and yellow, and white the compound of all three, were as distinctly presented to the imagination as could be done by placing those colours before the open eyes at noon day. The two compound colours, green and orange, also appeared, but they were neither so perfect nor so permanent as

any of the preceding, and they were seen only during three experiments made in the course of one evening. The compound colours, indigo and violet, never appeared in any of the foregoing experiments, but I conceive they probably would have been seen in the same experiments that produced green and orange if these had been prosecuted long enough; but the degree of pressure employed on those occasions caused so much pain that I remitted it much sooner than was done in any of the other experiments; and I have never ventured to use such violent pressure again, because there was a painful sense of fulness and tenderness in both eyes all the succeeding day. Perhaps, however, the dark chocolate-coloured red may deserve to be considered as an imperfect attempt to produce indigo or violet, because although blue was distinctly seen in all the experiments, the proportion of it

was much less than that of the red, or the yellow, or the white *.

Thus it seems difficult by means of pressure to excite any other actions in the retina, than those which are produced by red, yellow, blue, and white lights, which I think admits of the following explanation: Pressure, being capable of causing the appearance of a variety of colours, must be considered as a mere stimulus to excite the retina into action, without having any specific tendency to cause one action more than another; therefore, if it operate beyond that degree which is necessary to cause the three

* Since writing the above, I repeated the experiment twice, one night after retiring to bed, in both which instances blue and indigo were seen in abundance; there was also very perfect green, but *no orange*. The general appearance had a great resemblance to the spectrum of a rich kaleidoscope.

simple actions, it produces the compound of all three, white, in preference to the compound of only two, such as are the four compound colours, orange, green, violet, and indigo; because the certain production of any action that is compounded of only two of the simple actions, must require a peculiar stimulus capable of excluding the third, which specific power does not belong to mechanical pressure.

The production of indigo, violet, green, and orange-coloured spectra is therefore liable to uncertainty, because they seem either to result from pressure having stimulated the retina till it seeks relief in so much variety of action, as to produce the appearance of those colours as it were by accident, or else the pressure merely excites into operation a predisposition for such actions as produce the appearance of the

compound colours, which predisposition must be the effect of other causes, such as the colours that the eye may have been engaged upon for some time previously, and the state of the system at the time of making the experiments. It has been already mentioned how the organ of vision being fatigued by one kind of action, seeks relief by assuming the opposite kind spontaneously—hence a predisposition for the latter is induced, which may only require the stimulus of pressure to bring it into operation. The state of the system appears to have considerable influence in regulating the variety and brilliancy of the colours in the spectra; so, they have always appeared to me the least vivid when I happened to feel languid or fatigued at the time of making the experiment; but once that I tried it after stimulating myself considerably with strong coffee, the spectrum was then far more

splendid than upon any other occasion. The deep hue and brilliancy of the colours and the general sparkling, beautiful appearance of the whole spectrum baffles description. I can think of nothing which bears any comparison with it unless it be a piece of Mosaic work, composed of the finest gems, rubies, emeralds, diamonds, &c. &c.

The spectrum cannot be seen unless the whole attention is devoted to it, and when most vivid, it disappears the instant another idea is permitted to enter the mind. Success also depends very much upon the right degree of pressure being employed—we may use too much as well as too little; this remark will probably be sufficient, because it seems reasonable to suppose that different degrees of pressure may be required to excite the actions of the retina in different per-

sons, which nobody but themselves can determine. Two friends of mine have tried the experiments with different degrees of success—one has produced all the variety of colours which I have described, but they were only faintly perceived; the other has only succeeded hitherto in producing scintillations of light which he compares to the last fire of sky-rockets: how far these different results may be the effect of the eyes being pressed improperly, or other causes, remains to be proved.

We now come to consider the actions which take place in the retina, with a view to ascertain whether they are the effect of life or of organization; and for this purpose it will be necessary to direct our attention to the three following circumstances, *viz.*, the variety of colours,—the arrangement of them,—and the va-

riety of motion seen in all parts of the spectra.

It appears to me that the orderly distribution of the red and blue spots is all that can be explained by any thing we know of organization ; and I am rather doubtful whether even this may not entirely result from the cellular structure of the vitreous humour making unequal pressure upon the retina ; and if this be the case, then it affords no elucidation of the nature of nervous actions in the retina : but as this seems to be a doubtful point, we will suppose it to result from the retina itself, and it may be further conceded, that the variation in the shape of the red and blue spots was the effect of motion in the fibres of the retina ; and in granting this much, the very utmost is allowed which can be attributed to the effects of organization.

An idea that the variation of colours could result from contractions and expansions in the fibres of the retina, cannot be supported for one instant by any thing seen in these experiments, for the only circumstance which can be considered as evidence that contractions and expansions are performed in the retina, is the variation in the shape of the red and blue spots; and that constitutes the strongest possible proof that such motion has nothing to do in the *production* of colours, because the same points maintained the same colour notwithstanding they appeared very frequently and rapidly to change their shapes. There is, therefore, no reason to believe that organization is concerned in the production of the apparent colours, because all the other motions seen were so decidedly such as organized matter could not perform, that they must be the motions of a fluid; and

as that fluid appeared at different periods to be of different colours, we must suppose it to be nervous fluid, or life itself, because we are acquainted with no analogy that will enable us to attribute similar properties to any thing else. Hence so far as the nervous actions which constitute vision will serve to explain the nature of nervous actions in other parts of the body—we must conclude that very considerable motion takes place in the vital principle, or life of every part where nervous action is going on, and consequently that nervous action is partly constituted by the increased motion of life.

Any attempt to investigate this subject further necessarily leads on to the contemplation of thought, because the actions which constitute vision are, in point of fact, only completed in the mind.

In considering the nature of cogitation, we find, that in perspicuous thought two ideas cannot exist in the same mind at the same time; and whether we conceive an idea of the immense mass of matter which composes this world; or whether we conceive an idea of a mathematical point which has neither length, nor breadth, nor thickness—the one idea occupies the mind as much as the other, neither more, neither less. Hence we must conclude that there is no substance in thought—that it has no parts—that it occupies no space—that it only exists during the continuance of those actions which produce it, and that one continued operation of the whole mind without variation is necessary to constitute an idea. Thought is so inseparably connected with those actions which produce it, that we are almost induced to believe it to be mere action itself; and this the more espe-

cially, because we are acquainted with nothing beside motion which bears any analogy with what we can conceive of thought. Thus, whether we contemplate the slightest possible movement of the smallest animalcule, or the walking of an elephant, or the flying of a bird, or the rapid transmission of light through the immeasurable space between the most distant visible fixed star and this globe; in all these instances the motion is equally perfect, and it may be said of it as we have observed of thought—there is no substance in motion—it occupies no space—it has no parts, and it only exists during the influence of the cause which produces it.

I know not, therefore, how to define thought better than by saying, it is the result of life operating in the brain with consciousness.

If we seek to understand how life operates to the production of thought, the same insurmountable difficulty is encountered as when we endeavoured to explain the formation of the ocular spectra. Mention was then made that there seems reason to believe that an increased motion of life takes place in the retina during the production of the spectrum ; but this very possibly answers no further purpose than to contribute more life in proportion as it is expended in vision ; for as the exercise of animal functions occasions the expenditure of life, there must be fresh supplies to compensate for the loss in every organ, so long as the function continues to be exercised.

The cause must always be adequate to the effect ; therefore, as parts have more need of life while acting than they have during a state of quiescence, then, agreeably

to the known economy of nature, we must infer that they have most when it is most wanted ; and by the same rule we must conclude there is more life in the brain during the production of thought than at other times, and also, that it has an increased motion ; but although the living principle should be supposed to flow with every variety of speed and in every variety of direction, its motion alone considered affords no kind of elucidation of the *modus operandi* by which thought is produced.

Hitherto, however, we have only been considering thought such as it is common to man and brutes ; let us, therefore, see whether more can be learnt by inquiring into the nature of abstract thought, which is peculiar to man.

It is exceedingly difficult to draw such a distinguishing line between these two

kinds of thought as will be considered perfectly satisfactory by all those who think upon the subject; but at present I see no objection to the following definitions.

Thought, such as is common to man and brutes, originates from causes which operate upon life, through the medium of organization, and never exceeds in degree that which may be produced by associating the effects of present irritation with past experience; and it never exists in brutes but as the consequence of some stimulus operating through the medium of one of the five senses.

Abstract thought, or that peculiar to man, on the contrary, originates from a cause which operates in a direct manner upon life itself, without the aid of any medium; and it far exceeds in degree the

above described, because it extends to reasoning on subjects concerning which neither experience, nor any of the five senses, can yield the slightest intelligence ; and, consequently, it may and does exist independent of stimuli operating through the medium of organization.

The truth of these distinctions appears to me evident, from considering that brutes are incapable of intellectual pleasure ; for all their thoughts seem founded in the pursuit of sensual gratification, to answer a present purpose, either in obedience to the first law of nature, self preservation, or, in obedience to the second law of nature, which tends to ensure a continuation of their species.

Man, on the contrary, thinks from inclination, independent of excitement through the medium of organization, because he

delights in every acquisition of knowledge, and is thus fitted to derive gratification from the very reverse of all that is sensual. It is, therefore, unquestionable, that the human mind, besides acting in obedience to the same two laws which operate upon brutes, is influenced by a third, which imparts to it such an insatiable desire after knowledge, that, having thought upon all within the vast circle of human vision, it tries to comprehend infinity, and, as if conscious it never can receive its full fruition in time, it thinks forward into eternity.

Mere animal life appears not to act at all if placed under circumstances which remove all external stimuli that are capable of exciting it into action, it then merely exists ; as, for instance, the excluded ovum will not hatch without the stimulus of heat. This shews that the

vis inertiae of matter is common to animal life, and if this be taken in connexion with the observations already made upon the thoughts of brutes, I conceive it will justify a conclusion that mere animal life never operates to the production of thought, without being excited thereto by some cause that is distinct from any property belonging to itself.

Now, as man is known to think independently of stimuli operating through the medium of organization, this proves him to possess a principle of pure volition, which does not belong to mere animal life: hence we must infer, that man not only has an animal life, in common with the rest of the animal creation, but that he also possesses some still more refined sentient principle (soul), which is peculiar to himself, and has the power of acting upon his animal life to the production of cogitation.

Different men display different degrees of intellectual power, but this tells nothing against their being equally endowed with soul ; because, as organization is the instrument by which animal life manifests its operations, so animal life is the instrument or medium by which the operations of the soul are manifested. Two horses, equal in vigour, may differ very greatly in speed, merely because they differ in organization ; and the speed of any horse may be irreparably impaired by doing an injury to his organization. Similar reasoning may explain how a perfect idiot may have a soul equal to that of an individual who possesses the highest possible degree of human intellect, viz., the organization of the two brains may differ, or the animal life of the one may be less capable than that of the other of performing those actions which are necessary to the production of thought. Every man who attends to himself will

find that he can think with ten times more effect on some days than he can on others ; —this merely results from his animal life being in different states more or less fitted for cogitation.

This Inquiry might now be extended to shew the order in which life operates upon different parts of organization ; but I conceive this had better be delayed for the present, together with some Observations on Animal Instinct, and a Theory on the Formation of Local Diseases, which I intend to prefix to an Essay on Morbid Affections of the Prostate Gland.

PREFACE.

THE present Essay claims some indulgence on account of circumstances which, I think, it may not be improper to mention in this place.

I did not know the prize-subject till within three months of the 25th December, 1822, on or before which day the dissertation was required to be delivered at the College; a period, it must be allowed, too limited for the consideration of so extended a range of disease. When I commenced writing, it was indeed more with a view to try what could be done, than with an expectation of being able to accomplish the proposed object; I was, therefore, obliged to commit my ideas to

paper as rapidly as possible, without regard to the best mode of expressing them; and if it had not been made known from the College, that the number of important facts which the dissertation might contain would be considered the chief points of excellence, I should not have dared to appear as a candidate with so crude a performance. The want of more opportunity, compelled me also to begin writing before I had formed any regular plan. I therefore commenced with considering the slightest disease known to affect the bladder, and afterwards proceeded to the others as they offered themselves, endeavouring, as much as possible, to carry on a connected chain of thought from first to last throughout the work. The foregoing statement may, perhaps, be deemed a sufficient apology for any imperfections in the written Essay; but it may be considered no excuse for their appearing in print.

That some corrections have been made, for the sake of perspicuity, and a few observations added in the form of notes, is true ; but more than this could not have been done without depriving me of the advantage of publishing under the sanction of the College. I am, however, far from wishing to make alterations in the matter it contains—a few additions would supply its deficiencies, and some trifling transpositions might improve the arrangement ; and the general style of the work might assuredly be more elegant ; but I am not aware that the ideas would have been thereby more correctly conveyed. Works of imagination have need of elegant diction to recommend them ; but works of utility chiefly require truth with perspicuity, and I have simply aimed at being useful.

Had this Essay commenced with an

epitome of the history, theory, causes, symptoms, and treatment of vesical diseases in general, it certainly would have been more complete; but as we must always particularize before we can generalize, I conceived this part had better be written last; and then, as already stated, the want of time proved an insurmountable obstacle to its being written at all.

A work on the present subject has long been a desideratum in surgery, for all that has hitherto been advanced upon it is dispersed throughout the writings of so many authors as to render it almost inaccessible to the generality of practitioners. But besides bringing together, as it were, into one focus, the more approved previous opinions, I do not hesitate to assert, that this volume contains much new matter, with respect both to the nature and treatment of the diseases in ques-

tion. To notice only a few of its peculiarities, I may remark, that disease in the urinary bladder is here shewn to originate not unfrequently in consequence of ulcerations in the large intestines. Diseases and injuries of the spine are well known to produce paralysis of the bladder, but it has never before been pointed out that such vertebral affections may cause irritability and mucous discharge from the bladder ; neither has it been demonstrated how greatly such vesical disease may be lessened, notwithstanding the spinal disease does not admit of being cured. On retention of urine, much that is new and important is communicated. Hitherto it has never been explained, or even suspected, that retention of urine sometimes proves fatal in consequence of a vicarious secretion taking place into the lungs, and causing suffocation. In the present work, copious directions are laid

down to discriminate between cases in which the catheter ought, and those in which it ought not, to be employed, and much care is taken to explain various ways of using that instrument to ensure a successful introduction of it, some of which have never been taught before. Considerable difference of opinion exists as to the propriety of removing the catheter, or keeping it in the bladder for a time after evacuating the urine in cases of retention; an attempt has been made to set this point at rest by detailing circumstances under which it ought to be retained, and others under which it should be withdrawn immediately after taking away the urine; and the same may be said respecting the management of the cannula, after the operation of puncturing the bladder per rectum. On the subject of stone, there will be found much original information. I am not

aware that it has ever before been made known that calculus may be formed entirely out of the secretions of the bladder independently of the urine ; this is now proved to be by no means an unfrequent source of that distressing disease. In the last place, the observations respecting the treatment of patients before and after the operation of lithotomy, are considered to be not the least valuable part of the Essay, because they form principles which ought to regulate the treatment of all cases attended with serious wounds, whether they are produced by the hand of a surgeon, or happen to be the effect of accident.

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PRACTICAL ESSAYS,

&c. &c.

INTRODUCTORY OBSERVATIONS.

THE urinary bladder may be described as a hollow muscle, or muscular cavity, lined by a mucous membrane ; it is therefore subject to all those diseases, injuries, and imperfections, which are confined to such structures ; and also to some others which are peculiar to no structure, having been met with in almost every part of the human body.

Those morbid affections which may be said to arise out of the muscularity of the organ, are irritability—rigid contraction, and atony, which last may or may not be

combined with paralysis—spraining or unnatural dilatation.

The affections proper to the mucous membrane are, increased secretion of the natural mucus, vitiated secretions, suppuration, ulceration, and stone. I say stone, because I have no doubt of being able to shew, in the sequel, that calculus in the bladder is often formed from the secretions of that viscus. In common with every other organized part, the urinary bladder is also liable to inflammation, schirrus, carcinoma, &c. &c.

By saying that irritability of the bladder arises out of its muscularity, it is not intended to convey an idea that the muscular fibres are necessarily in a state morbidly disposed to act. The muscular coat naturally contracts, in obedience to a stimulus applied to the mucus lining; hence, if the internal membrane be more than usually excitable, the muscular coat will contract more frequently than it should do, and then the bladder may, with the strictest propriety, be said to be irritable. The

mucus lining may, however, be in a very susceptible state, whilst the muscular fibres are incapable of contracting; and as nobody would ever think of saying the bladder was irritable under those circumstances, I have been induced to say that irritability of the bladder arises out of the muscularity of that organ, to denote that the muscular fibres are always brought into action more frequently when the bladder is said to be irritable, than they are under circumstances of perfect health. And another reason for saying that irritability of the bladder arises out of its muscularity, is, that I believe it is sometimes altogether owing to a faulty state of the muscular fibres.

Irritability accompanies most of the diseases that affect the bladder, therefore it only deserves to be noticed separately when it seems to exist alone; for, if there be indications of more serious disease, then the vesical affection will be differently named, in order to convey the best possible knowledge of the nature of the whole disease by the term employed.

OF IRRITABLE BLADDER.

THE simplest possible form of irritable bladder consists in that viscus being perfectly healthy, with the exception of its being excited more easily than it should be, to contract and expel its contents, in consequence of its being in a state to require less of the natural stimulus to bring on the expulsive action. This is indicated by the patient discharging his urine more frequently than usual, and by the calls thereto sometimes being so urgent and sudden, that the flow of the water cannot be restrained, by all the efforts of the individual, till he has put his clothes aside: and a third symptom is, that the urine often escapes involuntarily during sleep.

When there is no actual disease of the bladder itself, the most frequent causes of its becoming irritable are, diseases of the urethra, of the prostate gland, of the uterus, of the vagina, of the rectum, of the

anus, of the kidneys, cutting of teeth, and, lastly, disorder of the digestive organs.

The treatment of the vesical affection proceeding from any of the above causes, is extremely simple, so far as the bladder alone is concerned, as it consists wholly in removing the cause; and, when that has been completely effected, I have never known a single instance where the irritability of the bladder has not entirely subsided.

The means, of course, must vary according to the peculiar circumstances of the case; and these, most probably, will be best shewn by the recital of cases. It may, however, be mentioned here, once and for all, that when disorders of the digestive organs occasion irritability of the bladder, every remedy that has been known to benefit those organs, may occasionally become useful in the treatment of the irritable bladder.

are more self-opinionated, and very often will not believe that certain articles of diet which they have taken with apparent impunity for many years, can have any effect in causing irritability of the bladder, when in truth they may have been slow in their operation, and only required the more time before they could irritate the digestive organs sufficiently to disturb the urinary organs. Besides, the disorder in the digestive organs of adults is often brought on, not so much by eating improper food as taking too much of that which is excellent, or by eating of it too frequently. Adult patients, also, being under no restraint, are more apt than children to eat of great variety of food ; thus they often take many things very improper for them, none of which, singly, would produce any sensible inconvenience, but when combined, are capable of causing great disorder.

Under these circumstances, so much time elapses between the operation of the cause and the production of the effect, as to render it very difficult to convince patients

that their sufferings result from errors in diet; and without they are persuaded of this, they often will make no change. Children, on the contrary, can be controlled. Another thing, too, which accounts for these complaints being more readily curable in children than in adults is, that their bodies are in a more natural state, and more disposed to health in consequence of their having been less exposed to those causes which are productive of disease—hence their diseases soon disappear, when the causes of them cease to operate; but in adults we often have not only to remove the causes, but frequently to remedy the effects of them.

CASE.

A gentleman, about twenty-three years of age, who never had any complaint in his urinary organs before, discovered that he passed his urine very frequently in very small quantities, and in a forked stream. I suspected a stricture, and examined the urethra with a bougie, but discovered no contraction—the canal throughout its whole

length was however in a very irritable state, and I have no doubt inflamed.

This gentleman was of studious habits, and when so employed, he emptied his bladder every ten minutes, and even then did not feel quite easy in the intervals. I could find no cause for this disorder of the bladder, unless it proceeded from some irritation in the digestive organs. His tongue was very much furred, particularly in a morning, and the bowels were irregular. He was frequently oppressed with low spirits, gloomy thoughts, had frightful dreams, and always awoke more fatigued in the morning than when he went to rest the preceding night. He took pil: hydrarg: — sarsaparillæ decoct: — magnes: vitriolata infus: gentianæ compositæ, et decoct: cinchonæ. These medicines were continued many weeks, and it was observed, that just in proportion as they relieved the stomach and bowels, so did the irritability of the bladder lessen; but he could not be any wise comfortable without taking some of the above medicines constantly; for so sure as they were omitted, all his symptoms

returned. This satisfied me, that the cause of all his sufferings in the urinary organs continued to operate, and that the remedies only acted as palliatives. I suspected that there must be some error in his diet, and upon careful inquiry found that he had lived very differently during the whole of his illness, and for about seven months previously, to what he had done before that time. He had formerly been used to eat only three times a day at proper intervals, and drank nothing but water; but seven months before he had any irritability of the bladder, he had taken to drink wine after dinner, and to eat suppers, so that he then ate four times a day; and another circumstance was, that he ate bread with the bran in it, which I have often known to disorder the stomach. Thus I discovered three errors, fully sufficient to account for his illness. He ate improper food, *viz.*, the bran bread; he took too much food, *viz.*, suppers; and drank wine, to which he had not been accustomed, and which evidently disagreed with him, for after it he was always uncomfortable till he had taken some tea. From this time his

bowels were preserved regular, sometimes by means of *magnesia alba*, and sometimes by the *pil: hydrargyri*; he left off wine and suppers, procured the finest wheaten bread possible, and ate moderately; and without the use of any other means he very soon got perfectly well. The bladder was no longer irritable, neither was the urethra, for he passed his urine only twice a day, and it flowed in a full stream.

The following case is remarkable for the length of time during which the patient had suffered, and the shortness of the time required for the cure: it also serves forcibly to shew that the urinary organs are influenced not so much by the kind of meat and drink that disorders the stomach and bowels, as by the mere circumstance of the digestive organs being disordered; for, in this instance I have no doubt that wine was the original cause of all the illness, and yet it will be observed, that he was ultimately cured by a judicious use of wine.

CASE.

A gentleman of spare habit of body, and

36 years of age, residing in the West Indies, and being distressed with great irritation in his urinary organs, for which he could procure no relief, came to England for medical advice. A friend of mine who had known him abroad met him soon after his landing, and recommended him to consult me. He informed me that he had been ill thirteen years ; that he was more or less constantly wanting to make water, and even when he had emptied his bladder, he did not feel quite easy. The quantity of his urine varied a great deal, and sometimes he voided so much as made him think he had diabetes : he had pains about his hips and down his thighs, and sometimes in his loins, and occasionally there was pain in the glans penis. He was oppressed with low spirits, and almost despaired of ever having better health. It should have been mentioned, that the irritation of the bladder commonly disturbed his sleep in the night. He could assign no cause for his indisposition. I, therefore, began to suspect disorder of the digestive organs occasioned by some error in diet, and made particular inquiry into

those circumstances. I found that he lived like numbers of other fashionable people, —he sat up late at nights—breakfasted about eleven o'clock—lunched at two—dined at five or six in the evening, and took tea or coffee afterwards. He drank about a pint of wine every day after his dinner, and sometimes a larger quantity. He always found himself more uncomfortable after his wine for the remainder of the day, but if he omitted it he never failed to be worse on the day following, and the same thing happened if he took more than his usual quantity. He had furred tongue, and was frequently subject to cough and shortness of breathing, so that he was fearful of consumption. I recommended him to rise early in a morning, never later than seven o'clock ; to breakfast between eight and nine ; to eat no lunch ; to dine at three o'clock ; never to eat after eight in the evening ; always to go to bed at eleven ; and totally to abstain from all kinds of fermented liquors, and take the following medicines : Pil : hydrarg : omni nocte et haust : \bar{c} infus : gentian : com : tr : aromat : et magnes : alb : bis die, *i. e.*, primo mane et horâ ante prandium.

Having pursued this plan four days, he called to tell me he had not been so well for thirteen years, and that he thought himself perfectly cured. He came to see me several times afterwards, but I did not find it necessary to advise any thing else, for he continued perfectly free from irritation in his urinary organs, and was in excellent spirits. He remained in this country 18 months, to see if his complaints were likely to return, and during that time had one relapse. I then discovered his stomach was very much out of tone, and merely told him to drink about half a pint of sherry every day after his dinner, which greatly surprised him, because I had formerly forbidden him to take any wine. He tried the wine, and in a few days was perfectly well again.. I then explained to him, that if he drank any kind of spirituous liquor constantly, it would bring on all his former complaints, but if he only took wine now and then, when his digestion failed, and then left it off again when his digestive powers returned, that he might by that means alone preserve his health. I

have heard from him two or three times since he went back to the West Indies, which happened five years ago, and he always stated that he remained free from irritation in his urinary organs. One reason for my supposing this patient to have originally been made ill by drinking wine and spirits was, because he said he was fond of rum and water, with a great deal of sugar in it, and formerly drank of that liquor freely, and had discovered, by repeated experience, that if he exceeded the usual quantity of wine, or took any other stimulus, he always became worse.

OF IRRITABLE BLADDER, CAUSED BY
ULCERATIONS IN THE BOWELS.

ALL the foregoing cases serve to shew that disorder of the stomach may and does often produce great irritability of the urinary bladder. I will now relate two or three instances of disease in different parts of the bowels having the same effect ; at least if the morbid affection of the bowels did not originally occasion the irritability of the bladder, it certainly protracted the cure of the latter ; for, when a certain degree of relief had been afforded, by improving the state of the stomach, no further advancement could be made till the disease in the intestines was removed.

CASE.

A gentleman, thirty-three years of age, and who commonly enjoyed excellent health, became affected with great irritability of his bladder. He had pains down his thighs, over the pubes, in the perinæum, immediately in front of the anus, an aching of the glans penis, and sometimes in one of his testicles. He was continually desiring to make water; and sometimes after emptying his bladder, he felt acute pain at the neck of that organ, shooting thence along the urethra, till it reached the corona glandis, and then it seemed to encircle the penis. His tongue was extremely furred, and his countenance betrayed irritation of the whole system. Sometimes he had no appetite for food, and at others there was an almost insatiable craving, particularly between breakfast and dinner, and at such times his urine was perfectly limpid, materially increased in quantity, and the desire to void it was urgent and incessant; under these circumstances it was that he always experienced most pain

after evacuating the contents of the bladder. These symptoms clearly pointed out disorder of the digestive organs, and I expected as soon as this was rectified, that the irritation in the urinary organs would subside. He had been in this miserable state nearly twelve months, and the only difference in his mode of living was, that he had taken more wine than formerly, had been more engaged in literary pursuits, and had eaten hard biscuits at his breakfast instead of common bread. From the circumstance of his usually being worst in the forenoon, I suspected the biscuits which he ate at breakfast were a good deal concerned. His baker had assured him that they were made of pure flour and water only, but this I very much doubted, as they broke short and easily; I therefore held one to the fire till it was quite warm, and then could smell the shortening matter in it; so that, in fact, this patient was eating pastry at his breakfast; I may here mention that I know nothing which so certainly disorders, or aggravates disease in the urinary organs, as rancid fat or butter taken into the sto-

mach. He made some experiments to try which agreed best, the biscuits or common bread, and always found himself most comfortable when he took the latter; he therefore was persuaded to leave off the biscuits, and use the best French bread. When there was more than usual irritability of the bladder, and rapid secretion of urine, a few grains of *magnesia alba*, *soḋæ carbonas*, or *potassæ*, always afforded temporary relief. Sometimes, too, he derived the greatest comfort from *pil: hydrarg: ꝑopio*, vel *oleum ricini ꝑ tinct: opii*; he also took *infus: gentianæ comp:*, et *magnesia vitriolata*; these remedies, together with paying great attention to his diet, in about six or eight weeks restored his stomach to a tolerable healthy state, but he did not find a proportionate mitigation of the irritation in his urinary organs. This induced me to pay still more attention to the case. His *fæces* were examined, and when costive, they were of a natural and healthy colour, but some parts of them were covered with pus, which satisfied me there yet remained considerable disease in the bowels. He was often trou-

bled with slight griping pains; and when his bowels seemed to move, it frequently gave him pain in the bladder, and near to the extremity of the penis. This I accounted for by supposing that there were ulcers in the colon; that when the fæces lay long in contact with those ulcers, they received a patch of pus in shape and size exactly corresponding to that of the ulcers; and when the peristaltic action of the intestines moved the fæces over the surfaces of ulcers, that it occasioned irritation, griping, and sympathetic pain in the urinary organs.

I became still more convinced of the truth of this opinion afterwards, from finding that every thing which irritated the lower bowels, or brought away their mucus, increased the pain and irritability of the urinary organs. *Pilula hydrargyri* and the saline purgatives always aggravated the irritability of the bladder, if given in the smallest doses that would excite the bowels. Sometimes ten or twenty grains of kali or soda were recommended to be taken in a little water an hour before dinner, to correct acidity

of the stomach, and which always had that effect; but in two or three hours after, by the time it could have arrived in the colon, it always increased the irritation and pain in the bladder and penis; the only alkali which succeeded in correcting the acidity in the stomach without causing this irritation in the urinary organs was, *magnesia alba*, which appeared to me to result from its disturbing the mucus of the intestines less than the other two which have been mentioned. There was so much difficulty in acting upon the bowels without increasing the irritability of the bladder, that injections of warm water were tried, under an idea of this being the most simple remedy that could be employed; but even this always brought away a great deal of mucus from the colon and rectum, by which the complaint in the urinary organs was made worse. If the patient occasionally eat indigestible substances, he usually felt the most inconvenience from them on the following day, as I imagined, by the time they arrived in the large intestines. I may here notice that the currants in plum-cake

never digested with him, they might always be seen whole in the fæces; and so long as any of them lay in his colon, he never was comfortable in the urinary organs. The only aperients which could be used were *oleum ricini*, *magnesia alba*, *manna*, and very often it was necessary to combine tinct: *opii* with these, when there was more than ordinary irritability of the bladder. The *tinctura opii* was commonly recommended to be taken with a little *oleum ricini*; the *manna* or *magnesia* were usually given in the middle of the day, or about half an hour before dinner, and sometimes they were taken together; one or other was occasionally preferred, according as it was found to operate the best upon the bowels, or according to the degree of acidity upon the stomach. He fed upon mild, nutritious, light food, and drank very sparingly of wine, and that of the lightest kind, and only a little now and then, just to keep up the tone of the stomach. He bathed the pelvis in warm water daily, and by the use of these means he got quite well in about three months.

Instances of ulcerations in the bowels, producing irritation in the bladder, I should imagine to be of frequent occurrence, as I have met with four cases in the space of nine years.

CASE.

A little time ago I accompanied a friend to see a female patient who was dying of consumption : all the inside of her mouth and the surface of the tongue were covered with small aphthous ulcers, which led me to inquire into the state of her bowels and urinary organs : she had an obstinate purging, and severe griping pains ; there was very frequent desire to make water, and sometimes the strangury was so bad that she could void none. I made no doubt but the internal surface of the intestines was in a state similar to the mouth, and that it was the irritation in the bowels which disturbed the urinary organs.

CASE.

The third instance of this kind happened in a gentleman advanced in years* : it was, however, a recent affection, and got well rapidly by proper attention being paid to correct the disorder in the digestive organs. The fourth case I shall particularize when I come to speak of mucous discharges from the bladder.

* *Vide* page 153 of the Author's Practical Essays on Strictures of the Urethra, and Diseases of the Testicles, &c. &c.

OF IRRITABLE BLADDER IN CONSEQUENCE
OF DISEASE IN THE KIDNEYS.

THE urinary bladder is very liable to become irritable in consequence of nephritic complaints, which indeed is naturally to be expected, for there always exists a sympathy between parts which are engaged in the same function, or when the function of one arises from, or immediately succeeds to, that of the other, as happens between the kidneys and the bladder; thus irritation in either one of these organs is very often propagated to the other. It takes place from the kidneys to the bladder, because that is the course of the natural and healthy actions. This is well shewn in some cases of nephritis. When there is no urine secreted, patients are often distressed with a violent pain in the bladder, as though it contained a large quantity of water; and

in similar affections of the kidneys, when the urinary secretion continues it is voided frequently, and with pain.

CASE.

I have a kidney in my possession, the internal surface of which is covered with small aphthous ulcers. It was given to me by a friend, who informed me that it was taken from a woman who had suffered great irritation in the urinary organs, and had frequent micturition. The ulcerations have precisely the same appearance as those which I have seen in the mouth in two of the cases already mentioned, accompanied with ulcerations in the colon. The following is another instance of disease in the kidney, causing irritability of the bladder.

CASE.

The patient has had great frequency of making water for several years, and sometimes this symptom exists to a most distressing degree; the desire is incessant,

and the pain is not even relieved by the evacuation of the urine. The bladder is occasionally so irritable, that whether it be moderately distended with urine, or empty and contracted, the pain is equally great. Now and then there is a discharge of mucus from it. Red sand also frequently comes away with the water, and I have seen specks of blood in the mucus. There is pain and tenderness of the back, frequent sickness, and vomiting; pain near to the umbilicus, and pains sometimes in the bowels; pain near to the costa ossis ilii; burning pain in both groins; and pain down the insides of the thighs: these symptoms, together with the passing of red sand, certainly indicate disease of the kidneys; and, as they preceded the irritability of the bladder, I suspect the disease of the kidneys to have caused the latter; and, I am the more confirmed in this opinion, by finding that mild diuretics afford relief. It is true as will be hereafter shewn, that whenever the kidneys are affected so as to have their secretion diminished by their sympathizing with disease in the prostate and bladder, then also a de-

degree of benefit is often derived from occasional doses of mild diuretics, but I do not think that it happens so decidedly in them, as it does in the present kind of cases. This patient's sufferings are very much influenced by the state of the digestive organs, and we may say that those organs are influenced by the state of the urinary system, so that medicines which benefit the digestive organs also benefit the urinary organs, and remedies which relieve the latter, also prove advantageous to the digestive organs. Saline effervescing draughts; small doses of magnes: vitriol:, pil: hydrag: manna; and all the alkalies occasionally afford relief; and sometimes it is found useful to add light tonics, infus: gentian: comp:, infus: calumb:, infus: cascarillæ, dec: sarsaparillæ; but none of these medicines can be taken long together, so that a frequent change is rendered necessary. The contents of the bowels are often evacuated by means of warm water injections, and the severe pains are mitigated by tinct: opii c solut: amyli. Small doses of the cubebs and bals: copaibæ are the diuretics which best agree; besides which all kinds

of mucilaginous drinks are occasionally taken; and great comfort is derived by employing the hip bath, or immersing the whole body in the warm slipper bath.

Morgagni (3 Book, 42 Letter) relates four cases of disease in the kidneys, producing so much pain and irritation in the bladder, that, during the life of the patients, they were all thought to have disease of the latter organ. Two of them had calculi in the kidneys; a third was a case of tubercles, which, on being cut into, were found to contain a sanious humour; the fourth is reported to have had one kidney internally diseased, without any mention being made of the nature of that disease. But that which is most remarkable in these cases is, that one of them never experienced any pain in the region of the kidneys, and the others complained so little, so seldom, and at times were so perfectly free from pain in the loins, that the possibility of their diseases being in the kidneys was **not** even suspected.

If disease of the kidneys be capable, as

shown by the preceding cases, of producing irritability of the bladder, I think we may be permitted to conclude that calculi lodging in the ureters may have the same effect. An urgent desire to make water is one of the symptoms that almost always attends the passing of a calculus along the ureter, but I have never met with a case where the calculus has been more than a few days in moving from the kidney to the bladder. Morgagni, however, and also some other authors, have recorded cases of calculi of such magnitude being found in the ureters, as to leave no doubt of their having lodged there for a considerable time. I apprehend if this were to happen, without any other disease existing at the same time in other parts of the urinary organs, it would be very likely to cause irritability of the bladder. In most, if not all, of those cases noticed by Morgagni, there were either other calculi in the bladder or in the kidneys, or in both those situations ; so that we cannot determine how far the accompanying symptoms were produced by the calculi in the ureters, or by those in the other parts.

OF IRRITABLE BLADDER, IN CONSEQUENCE
OF DISEASES IN THE URETHRA.

THE urinary bladder frequently betrays symptoms of great irritability during the existence of a gonorrhœa : so long, however, as the gonorrhœal disease continues, the vesical affection seldom attracts particular notice, because it commonly subsides with the urethral disease. Mr. J. Hunter recommends for these cases to be treated with opiate enemas, opiate plasters to the pubes or the sacrum, and blisters to the perinæum. I have met with several instances of great irritability of the bladder attending gonorrhœa, and have invariably found them to be relieved by light tonic medicines, and I account for this in the following way. If the irritation of a gonorrhœa extend so far backwards as to the

bladder, it shews the existence of great disposition to *continuous* sympathy, which prevails most generally under circumstances of constitutional irritability with debility, which renders parts very susceptible of morbid action ; for when irritable they are easily excited, and when weak they cannot resist impressions : hence slight tonics prove useful, by removing the debility, and also the consequent irritability, which causes the irritation of the gonorrhœa to retire within the specific distance.

CASE.

A young gentleman from the continent applied to me for the cure of gonorrhœa. There was a profuse discharge from the urethra, but the symptoms which distressed him most were, an incessant desire to void his urine, and excruciating pain whilst voiding it. The bladder was so irritable, that he experienced no relief from emptying it, and he told me that the pain which accompanied making water was so dreadful, that it almost deprived him of his senses. He had

been ill about a month, had eaten extremely little food, had been purged most days, and was distressed in his mind lest his friends should discover the real nature of his disease. He was both weak and irritable.

I recommended him to eat moderately of plain food, to bathe the perineum in warm water, and to take as medicine equal parts of *mistura camphoræ et infusi genjianæ comp*: In four days the irritability of the bladder was entirely removed, and the only symptom which troubled him was a discharge from the urethra.

Several more similar cases might be adduced, if it were necessary, but the above answers very sufficiently to explain the principle for which it has been cited.

The patient whose case has just been related, is naturally of a strong constitution, and by no means irritable; we may therefore be allowed to conclude, that the bladder became irritable in consequence of low diet, purging, and anxiety of mind

having irritated and debilitated the whole system ; and, if this inference be correct, it teaches how an individual, being in a similar state of health at the time of contracting a gonorrhœa, may have symptoms of irritable bladder appear so soon afterwards, that they shall seem to arise from the gonorrhœa, when, in truth, the irritability of the bladder is entirely owing to the weak and disordered state, of the constitution. I scarce need to say, that whether the disordered state of the system existed before the gonorrhœa, or has been brought on afterwards, the treatment must be precisely the same for the cure of the irritable bladder.

Having pointed out how the state of the constitution, during the existence of gonorrhœa, may occasion irritability of the bladder, I will quote a very interesting case from Sir Everard Home's work on Strictures, to prove that the local treatment of gonorrhœa may produce an irritable bladder.

CASE.

“ A gentleman, twenty-six years of age, in September 1786, immediately after having returned from India, caught a gonorrhœa, which was treated in the common way, by using an injection of *sacchrum saturni* diluted in water. The discharge suddenly disappeared three days after this treatment was commenced, and a violent pain was felt in the perinæum ; a frequency in making water came on, with a violent spasmodic affection of the sphincter vesicæ, and in the rectum. These symptoms increased to a most insufferable degree ; opiates were employed, both in clyster and by the mouth ; but although above a dram was administered by the anus, and two grains of the extract of opium by the mouth, every four hours, it seemed to have no effect on the spasms, or the irritability of the bladder, which continued with nearly equal violence. Warm applications, in the form of bladders filled with water, flannel, fomentations, and poultices, were tried in vain. Musk in doses of one scruple

every four hours gave no relief, although continued two days; after which camphor was tried. During this time the patient could not retain his urine more than ten or fifteen minutes: when the urine came away, the pain in the glans penis was violent; this seemed to be a little alleviated by immersion in hot water. The irritation of the bladder brought on increased secretion of mucus, which followed the urine. The camphor julep seemed to make the spasms less frequent; but whether that was really the case could not be ascertained, as, after two days' continuance, the symptoms were equally violent. At this time the complaint was of a fortnight's standing. A bougie was now passed for some inches up the urethra, but this produced no effect: it was then tried covered with oil, and one fourth part balsam copaibæ; this gave a little pain in the glans, but different from that brought on by the complaint. It continued for some time after the bougie was withdrawn, and next day a discharge of matter from the urethra came on, and he found himself easier. In a few days he got well."

The treatment of the gonorrhœa, in the two preceding cases, seems to have been a good deal concerned in causing the irritability of the bladder, it may therefore be well to mention an instance of irritability of the bladder succeeding to gonorrhœa, where the treatment of the latter did not appear to have any share in bringing on the vesical irritation ; for the mode of cure showed it to result from a morbidly irritable state of a spot in the membranous part of the urethra.

CASE.

A gentleman, about twenty-eight years of age, contracted a gonorrhœa, the symptoms of which were by no means violent. He took oily emulsions for about twelve days, and then anodyne saline medicines for nearly a similar time, when the discharge and other symptoms being considerably abated, I ordered him Pulv : pip : cubebæ, ʒ ss. ter die, and in a few days the discharge entirely ceased, and he left off the medicine. Six weeks or two

months afterwards he complained that he did not think himself quite well in the urinary organs, for that he had an unnatural frequency of making water, when the desire coming on was so urgent and irresistible, that he had the greatest difficulty to avoid wetting his clothes. I advised him to bathe in warm water all round about the anus, perinæum, &c. &c., and now and then take pil: hydrarg: horâ sompi. These means afforded him little or no relief; and when he saw me again he told me that he had a slight discharge from the urethra. It was, however, not purulent, and as it merely stiffened his linen without staining it, I, of course, concluded it was only an increase of the natural mucus of the canal, and, under an idea that there might be a stricture, I introduced a bougie. There was no stricture, but a spot of the urethra, just beyond the commencement of the membranous part, was found to be morbidly irritable. For three days after having the bougie passed, he perceived neither discharge, nor frequency of making water, but then both these symptoms began to return. The

bougie was afterwards employed five or six times, allowing an interval of three days between every two operations ; since which he has remained perfectly well.

Strictures of the urethra are a very frequent source of irritable badder*. Indeed, this happens so commonly, that irritability of the bladder is generally set down among the symptoms of stricture. The treatment of these cases may be said wholly to consist in the use of those means which are best calculated to remove the stricture, for when that is accomplished, the effect ceases. This, however, must be understood as applying only to cases of mere irritability of the bladder ; for when other effects, which remain to be spoken of, have been produced, then, although the cure of the stricture will be an object of primary importance, it may not be all sufficient to relieve the vesical disease.

* *Vide* the Author's Practical Essays on Strictures of the Urethra and Diseases of the Testicles, &c. &c.

CASE.

A patient of middle age applied to me on account of great disorder in his urinary organs, which had troubled him, more or less, for several years : he could not tell the precise time. He had such extreme irritability of the bladder, as was attended with an incessant desire to make water : he was never easy, and his urine was expelled with great difficulty : it flowed sometimes better than others, but never without violent straining : when conveniently situated, he made water five or six times every hour, and was obliged to get up to do it several times in the night. Different gentlemen had attended him, and all of them endeavoured to pass bougies, none of which ever went more than half way along the urethra. I found a stricture at four inches, and with some difficulty got a bougie through it, but could not make it penetrate much further. To be brief, there were four or five obstinate contractions in different parts of the canal, and I had to make very many attempts before I could introduce a

bougie all the way along the urethra; but when this was done, the disorder of the bladder was materially lessened. The case still remains under treatment. A bougie under the middle size can always be made to pass throughout the whole course of the urethra. Sometimes he is perfectly free from irritation in the bladder, and at other times has too frequent a desire to void his urine. The average is, however, that he does not want to make water oftener than once in four, or five, or six hours. It is quite useless to multiply instances of this kind, otherwise many very interesting cases might be selected, that were attended with irritability of the bladder, which entirely subsided when the strictures were cured; indeed, cases of this description are not wanting in every publication on strictures of the urethra. Perhaps there is no other cause operates so frequently to induce irritable bladder as strictures of this canal.

OF IRRITABLE BLADDER FROM DISEASE
OF THE PROSTATE GLAND.

IRRITABILITY of the bladder often results from disease of the prostate gland, but the diseases of these two organs influence each other so greatly, as to make it sometimes difficult to discriminate which is the cause and which the effect ; and a circumstance which adds to this difficulty is, that the same cause may operate to produce disease in both parts at the same time. Attending to the history of the case will best enable us to decide this point. If the symptoms of disease in the prostate gland have existed some time before the frequency of making water came on ; or if the symptoms of irritation in both organs are evidently increased by such causes as are known only to operate upon the prostate, as for instance, friction against

the perinæum, by riding on horseback; then it seems reasonable to conclude, that the disease in the prostate is the cause of the vesical irritation, but even here we cannot always be certain, for it will be observed, that both these circumstances happened in the next case; and yet I am doubtful whether the irritation in the bladder resulted wholly from the prostate, because there was a slight diabetes, which shewed the existence of other irritation capable of disordering the functions of the bladder; and beside this, the patient could recollect that the quantity of his urine, and the irritability of his bladder, had been increased by causes, which did not occasion a proportionate aggravation of the prostatic disease.

The symptoms, which more particularly denote irritation in the prostate accompanying an irritable bladder are a sense of heat and fulness, or dull aching pain in the perinæum with occasional aching pain in front of the pubes, as though this latter part were pressed externally by some hard substance. In some instances, the

finger in the rectum will discover the prostate to be enlarged; and if the gland be pressed, it sometimes causes pain in front of the pubes; but it must be remembered, that considerable irritation may prevail in the gland without any enlargement of it. Should the prostate, however, be enlarged, then, very probably, there will be also a partial retention of urine, which may be the only cause of the bladder being irritable. This can only be known by introducing the catheter after the patient has used all his endeavours to expel his urine. Disease in the prostate operates directly, and indirectly, to produce irritability of the bladder; the direct effect takes place, when irritation is propagated, or continued, from the prostate to the bladder; and the indirect effect occurs, when some enlargement of the prostate merely prevents the complete evacuation of the urine, in which case the bladder grows irritable in consequence of the perpetual stimulus of the retained urine. This should be carefully borne in mind, because the treatment of these cases ought to vary according to the immediate cause of the vesical irritation.

If the bladder suffer from partial retention of urine, that must be remedied by the introduction of the catheter as often as necessary : the rest of the treatment, suitable for the generality of these cases, is so well shewn in the following case, that it would only be tautology to say more on the subject in this place. There may, however, be instances which require peculiarity of treatment, in consequence of the particular nature of the prostatic disease, but this can only be detailed in works which professedly treat on the morbid affections of the prostate gland*.

CASE.

A young gentleman just come up to town to attend anatomical lectures, was troubled with great irritability of his bladder: the first uncomfortable feeling which he experienced in his urinary organs occurred about ten months before leaving the country : it was a sense of heat in the perinæum, with frequency of making water, which always came on after riding on horse-

* I shall reserve my observations on this subject for an intended Essay on Diseases of the Prostate.

back, and usually continued the whole of the same day, till he got to bed ; at other times he was perfectly free from it. These symptoms increased, and then he not only experienced them after riding, but every day after dinner : they generally, however, went off upon drinking tea in the evening. About this time he was inconvenienced by obstinate erections in the night, and frequent seminal emissions during his sleep. The sense of heat in the perinæum then gradually changed to a very distressing aching pain and feeling of great fulness, so that he could not bear to sit with his thighs closed. He wanted to void his urine every ten or twenty minutes, and he made much more water than he drank of fluids daily ; it flowed variously ; sometimes in a twisted stream, sometimes forked, and at other times much as in health ; it generally stopped suddenly, and very often he had a pungent pain afterwards, which darted along the urethra, and terminated in the glans penis. His urine was usually pale, sometimes a little turbid, as though a small quantity of milk were mixed with it, but at others it was clear and limpid as water ; it

very seldom, however, was free from an unpleasant sweetish smell. Occasionally he has had some difficulty in voiding his urine, particularly in a morning after having very obstinate erections in the night; or if he happened to be so situated that he was compelled to retain his urine one or two hours at a time, then it would be long before he could expel any, and always came away in a very contracted stream. Now and then he had pain in front of the pubes, and down the inside of the thighs. As fæces moved along the rectum and pressed against the prostate, it caused pain in the glans penis, and also in front of the pubes. When there was more than usual irritation at the neck of the bladder, it was frequently accompanied with slight tenesmus. Pastry always disagreed with him, and amazingly increased the quantity of his urine, and the irritation of the bladder. He had a furred tongue; his bowels were irregular, and his countenance betrayed great irritation of the whole system. This patient having always had plenty of medicines at command had tried a great variety, and occasionally

found relief from some of them, but never for any length of time, and he seemed to have no knowledge of circumstances that indicated when any one deserved a preference. *Oleum ricini*, *pilulæ hydrargyri*, *decoctum cinchonæ*, *infusum gentianæ compositum*, and *soda*, were those from which he had derived the greatest benefit, but he had taken them all till they produced the very effects which they were intended to prevent. Among other things he tried *tinctura lyttæ*; at first it seemed to lessen the irritation about the neck of the bladder, and he thought himself more comfortable; but, after three or four days this medicine increased all his symptoms, and more especially the seminal discharges during sleep. This remedy was employed several times at different intervals, but always with the same result. I discovered that he ate too often in the day, and too much at a time; beside which, he drank too frequently, and a great deal too much; and all the fluids which he took were mere diluents, for he found that every kind of wine or spirits made him worse. He was taught that so much dilution weakened his

stomach, and that the same effect was still further promoted by an excess in eating, both as to frequency and quantity. He was limited to eat only three times a-day, of very plain food, in moderate quantity. To drink very little at a time, and to take as little as possible. He preserved the bowels regular by *oleum ricini*, or *pil: hydrarg:* and took *decoctum sarsaparillæ*. He bathed the perinæum often with tepid water. Under this treatment he very soon became a great deal better. The *sarsaparilla* was subsequently found to disagree; it was changed for *decoctum cinchonæ*, and he began to improve again. After a little time the *cinchona* acted too much as an astringent, and irritated the whole system; it was changed for *infusum gentianæ*, and he again went on well. Once or twice when the bitter infusion seemed to be too tonic, it was taken with an equal quantity of *mistura camphoræ*, and with the best effect. In short, with the exception of ordering him to bathe the perinæum, I directed the whole of my attention to improve the state of his digestive organs, and exactly in proportion as

the tongue became clean and the digestion good, so did the irritation of the urinary organs lessen; and, in seven or eight weeks all the irritability of the bladder was entirely removed, neither was there any sense of fulness, nor aching pain in the perinæum. He was in all respects quite well.

OF IRRITABILITY OF THE BLADDER FROM LOCAL CAUSES.

THESE may be various, such as extraneous substances which have been introduced there through the urethra; stones generated there, or which have come from the kidneys; morbid growths from its internal surface which sometimes are cancerous; ulcerations and inflammation. All these, however, require to be noticed separately. I shall, therefore, here speak only of one cause, *viz.*, retaining the urine long after the natural inclination to void it has been excited. This is done so frequently, without any thing worse than temporary inconvenience being felt, as would almost lead us to think that more serious effects would never be produced in a healthy individual by that cause alone, unless it were practised frequently; but, Mr. John Hunter writes:—

CASE.

“ A gentleman in perfect health, from retaining his urine beyond the inclination, in the play-house, had all the symptoms of an irritable bladder brought on, which continued several years, rendering him miserable.”

OF IRRITABLE BLADDER ATTENDED WITH
A DISCHARGE OF MUCUS.

WHEN the bladder is merely irritable as in the foregoing cases, there may be nothing more wrong in it than nervous irritation; but, if there be discharge of mucus in unnatural quantity, then there must be increased vascular action; because, as all secretions are formed from the blood, the quantity of them must in some degree be proportioned to the quantity of that fluid which circulates in the part from whence the secretion takes place. Mucus from the bladder is met with of four different kinds, or in four different states. Sometimes it appears much like jelly, adhering all round the inside of the vessel into which it is voided; and in one instance of this which I have seen, the mucus had a slight greenish hue, but in other cases it has been perfectly free from colour. Sometimes the mucus resembles pus so nearly, as to make

it difficult to discriminate between them. A third kind is a glairy mucus, so thick and tenacious that the end of a stick entangled in it, will elevate the whole in the form of a thick rope. The fourth only differs from the latter in containing a quantity of earthy matter, which is sometimes so fine and white, as to have been compared to hair-powder, but I have seen it in rough particles about the size of mustard-seeds, and one or two pieces have been nearly as large as a grain of wheat: in this state it looked very much like old mortar. The best way to determine whether there be a morbid secretion of mucus from the bladder, is to observe the urine immediately after it is voided, whilst it remains warm, for when cold it often throws down a sediment which may be mistaken for mucus. If none but cold urine can be obtained, it should be heated to the temperature of the internal parts of the body, before observation be made upon it. If mucus appear under these circumstances, it will be more satisfactory, but, if the urine become perfectly clear, we

are not thence to feel assured that it contains no vesical mucus, because I have seen urine that was clear both at the time of voiding it, and also after standing to grow cold, from which a deal of mucus separated and clung to the side of the pot so firmly, as to allow the urine to be poured away from it. Pus, I believe, may be distinguished from mucus by observing how it mixes with the urine. Pus seems to me both to blend more readily with the urine when they are stirred together, and to separate less completely than mucus does. To the best of my recollection, in every instance where I have had no doubt of pus coming away with the urine, the latter has always retained a milky or rather whey-like appearance. Sometimes the best mode of discriminating between the two, is to let the urine stand perfectly undisturbed for some hours in a cold place. Thus I have known a discharge from the bladder, which, when first voided, was so much like pus that I could not determine its nature, but which I was inclined to think pus, after standing a few hours assume so consistent

a form, as to leave no doubt of its being mucus. The smell of vesical mucus will also often distinguish it.

There is mentioned in Sir Everard Home's works, a case, where mucus was voided along with the urine, which, upon examination after death, proved to be prostatic secretion, and which had passed backwards into the bladder. It was known to be the secretion of the prostate by its still being connected to the excretory ducts of that gland. Hence it has been suggested, that prostatic secretion may be mistaken for mucus of the bladder ; but, I conceive this never will happen if sufficient attention be paid to the following distinctions. The mucus of the bladder rarely appears in any considerable quantity, without containing earthy particles, which may be seen and often felt under the finger. This does not happen in secretion of the prostate. The mucus of the bladder, or its accompanying urine, grows putrid and smells alkaline, soon after voiding much ammonia being disengaged from it : this I have never known to occur when the

mucus came from the prostate ; on the contrary, the secretion of the prostate seems to me always to have a peculiar mawkish odour, which belongs to no other secretion ; and although under circumstances of disease, I have known that peculiar smell, which has been compared during health to that of the Spanish chestnut, to be a little fainter, yet I could always discover it to be of the same kind of odour. Mucus of the bladder is only discharged along with the urine, and although this may happen with the mucus of the prostate, when it passes backwards into the bladder, yet I believe this occurs very rarely indeed, and that the prostatic secretion when formed in an unusual quantity, generally escapes externally along the urethra, as rapidly as it is poured out from the prostate. Mucus that is discharged along with the urine, very possibly may come from the kidneys ; but when this happens it seldom appears in considerable quantity, unless it bears a great resemblance to pus. Precisely the same kind of mucus may be secreted by the bladder, therefore a correct discrimination may

sometimes be difficult. We must be guided chiefly by other symptoms. If there be indications of disease in the renal glands more violent than the symptoms of disease in the bladder, and if they existed before those of the bladder, then we may be allowed to suppose that the mucus comes from the kidneys. But if the bladder was known to be diseased before the kidneys, then we may suppose the symptoms of disease in the latter to be sympathetic, and may conclude that the mucus comes from the bladder.

OF THE CAUSES OF MUCOUS DISCHARGES FROM THE BLADDER.

ALL those causes which have been mentioned as capable of producing irritability of the bladder, may, by being allowed to operate for a longer continuance, or by acting with more violence, occasion the mucus of the bladder to be secreted in unnatural quantity. The copious discharge of mucus, termed *catarrhus vesicæ*, is said, by the author of that article in *Parr's Medical Dictionary*, to result from cold, and that he has met with two instances of its being thus produced. The possibility of this happening cannot be denied, but there can be no question of its being an extremely rare occurrence. The same kind of discharge is produced by the irritation of stone in the bladder, but, judging from the works of De Haen and Morgagni, it certainly does not now occur from that cause so

frequently as it did formerly ; and perhaps this may be accounted for by there being less hesitation before undertaking the operation of lithotomy, than there was in the time of those authors ; so that the stone is now often removed before it has had time to produce such effect. My own experience would lead me to think that it results most certainly from the irritation of some portion of urine being always retained in the bladder ; and this seems to be the case whether the retention be caused by paralysis of the bladder, or enlargement of the prostate gland. It will however be obvious, from the cases which will be related, that disorder of the digestive organs has great influence over the mucous secretion of the bladder. One instance will be mentioned, where disorder of the stomach and bowels alone caused a mucous discharge from that viscus ; and in other patients, where there was retention of urine, disorder of the digestive organs also appeared to be concerned in causing the vesical mucus to be poured forth in unusual quantity.

Perhaps it may be thought from some of the following cases, that injuries and diseases of the spine might be enumerated amongst the causes of mucous discharge from the bladder, but, I believe that injuries and diseases of the spine only operate by preventing the complete expulsion of the urine; so that it is the irritation of the retained urine which in fact produces irritability of the bladder and the mucous discharge: besides, injuries of the spine cause disorder of the bowels, and that, very probably, may prove an additional cause of the vesical affection.

ON THE TREATMENT OF IRRITABLE BLADDER, WITH DISCHARGE OF MUCUS.

ALL those means which are generally found to allay nervous irritation may occasionally be useful in cases of irritable bladder, with mucous discharge. Opiates, either taken by the mouth, or injected into the rectum, or even into the bladder itself, are particularly serviceable ; and also warm water fomentations, frequently applied round the pelvis, the best mode of using which is the hip-bath. If the urine be imperfectly evacuated, the catheter must be employed more or less frequently, according to circumstances. If it be introduced dexterously, with facility, and without creating pain, and if it afford great relief to the patient, then it should be passed as often as there is a disposition to make water : if, however, other means be properly used at the same time, I believe

these cases will go on well, so far as the catheter alone is concerned, by its being introduced only morning and evening; though as above stated it may be better to employ it more frequently. But whatever else is done, nothing must supercede great attention to the state of the digestive organs, for that alone is often sufficient to remove all kinds of irritation in the bladder.

The uva ursi is so much depended upon for the purpose of checking mucous secretions of the bladder, that I think it right to make a few observations on the properties of that medicine. De Haen, I believe, is the author who has chiefly conduced to bring the uva ursi into notice, as a remedy for diseases of the bladder; but in my opinion the value of this remedy is overrated, and I am not perfectly satisfied that it exerts any particular influence on the urinary organs. De Haen relates several cases of stone in the bladder, accompanied with a discharge of mucus, which got better while the patients were taking the uva ursi; but it appears to me ques-

tionable whether the relief was afforded by the uva ursi, because it is mentioned, that opiates were given at the same time; it is true that he speaks of two cases of dysury which were alleviated by the uva ursi alone, but no mention is made of mucus discharge in either of those cases; and in some of those instances where mucus is represented to have come away in the urine, the bladder, the ureters, and the kidneys, were, upon examination after death, found to be ulcerated and to contain pus; so that it is not impossible that pus may have been previously mistaken for mucus.

The uva ursi appears to me to be useful only as a light tonic astringent medicine, and when given with this view it has never failed to answer my expectation. It imparts the same colour to the urine which vinum ferri does to water; but this depends upon the state of the kidneys and digestive organs, for I have repeatedly given it to patients who had irritation in the urethra and bladder, with accompanying disorder of the digestive organs and kidneys, and here it produced no visible effect on the

urine. Pulv: rhei and some other medicines tinge the urine, but they are not on that account thought to have any specific effect upon the urinary organs, and I am inclined to pass the same opinion upon uva ursi. I am in the habit of recommending the uva ursi in cases of gonorrhœa; and it seems to me to have similar effects to pulvis calumbæ, or pulvis gentianæ. Sometimes I advise it to be taken alone; at other times in combination with soda, or some one of the neutral salts; and in this mode of using the uva ursi my patients have certainly experienced benefit from it, but I have tried both calumba and gentian under the like circumstances with the same results. I have also prescribed these medicines in similar cases of disease in the bladder, and have not been able to discover that they operated anywise differently. The uva ursi is not so intensely bitter as either the calumba or gentian; on that account, and that only, it has sometimes been preferred.

OF IRRITABLE BLADDER WITH MUCOUS
DISCHARGE, CAUSED BY ULCERATIONS IN
THE COLON OR RECTUM.

It will be remembered that some allusion has already been made to the following

CASE.

A gentleman, about six or seven and twenty years of age, complained of extreme irritability of his bladder; during the day, between breakfast and dinner, he was incessantly wanting to void his urine; he frequently made water six times in an hour; and if he was not conveniently situated, but was compelled to retain his urine two or three hours, then he afterwards experienced great difficulty in making it flow. During the night, however, he seldom made water above twice or thrice, and he was most comfortable always in a morning before breakfast. He had occa-

sional tenesmus, and sometimes after making water, most severe pain in his bladder and glans penis, and the pain seemed to shoot all the way along the urethra to the extremity of the penis. His urine flowed very differently; sometimes very freely, sometimes in a twisted stream; sometimes the stream was very small, and broke soon after leaving the penis. It was frequently observed to stop suddenly, it was at such times that he occasionally felt an acute pain shoot along the urethra to the glans penis, and this was accompanied with a distressing desire to pass more water. Now and then he had griping pains in the lower part of the abdomen, and very frequently a feeling of coldness or pains on the inside of both thighs. His urine smelt very offensively, and on inspecting the chamber-pot, and turning the urine to one side, I observed a great deal of mucus clinging round the inside of the vessel; the mucus was transparent, and looked very like jelly of a slightly greenish hue. He had noticed the mucus in his urine about six months. His stomach and bowels were very much disordered, the

latter were costive, and seldom acted without medicine ; the fæces were hard, and the difficulty of getting rid of them sometimes occasioned so much straining, as brought on an attack of hemorrhoids. As regards the stomach, he was always wanting to eat, and almost always found himself worse after eating ; and after dinner he was so oppressed with his food, that very often he could not avoid falling to sleep. His tongue was greatly furred, and when he awoke in the night, his mouth always felt parched, and he was very feverish all over his body. Head-aches distressed him a great deal, and he was subject to slight bleedings from his nose. His countenance betrayed great irritation of the whole system, but he was fat, and his general appearance verified the remark of Dr. Pemberton, contained in his *Essays on Diseases of the Abdominal Viscera, viz.*, that there may be considerable disease in the organs of waste, without any diminution of the bulk of the body. He had been ill nearly three years, and had taken a great variety of medicines, some of which afforded him relief for a short time,

and then disagreed. He found most ease by carrying magnesia in his pocket, and now and then taking a little : this kept his bowels more regular, lessened the craving for food, and somewhat allayed the irritability of the bladder, but even this seldom agreed with him more than a few days together, so that he was frequently obliged to lay it aside.

From the manner in which he made water, and from the subsequent pain, I suspected there must be either stricture of the urethra, or stone in the bladder. I passed a bougie but met with no stricture, the urethra was, however, in a state highly irritable and inflamed : some days afterwards I ascertained, by introducing a sound, that there was no calculus. I then directed my attention principally to rectify the disordered state of the digestive organs. He was always worse after drinking tea, or coffee, or wine ; I therefore directed him to abstain from all these, and to take morning and evening two or three teacupfuls of infusion of malt, and to drink warm water with his dinner. About twice or thrice

a-week he took a small dose of pilula hydrargyri; and, he bathed the perinæum most days with warm water. Under this treatment he improved for nearly three weeks, and then he began to feel so much worse every day after the sweet-wort, as decidedly proved that it disagreed with him. It was changed for milk night and mornings, and he still continued the pilula hydrargyri. He then began to improve again, but the milk drunk cold soon disagreed, by purging; he then tried it boiled, and this had the opposite effect of confining the bowels; but when half of it was boiled and mixed with the other half cold, it agreed very well, and he continued to mend. Sometimes he was troubled with flatus in the stomach, and then infus: gentianæ comp: c̄ tinctura cardamomi comp: or decoctum cinchonæ c̄ spt: lavend: comp: proved useful. When the bladder was more than usually irritable or painful, relief was obtained from tinctura opii at bed-time, but the anodyne was generally combined with oleum ricini, or pilula hydrargyri, by way of preventing its constipating effects. The milk diet having been tried a few weeks,

began to disagree, and he was obliged to give it up. He then drank weak tea, and thought himself getting better, till the craving appetite returned, to correct which infusum gentianæ comp: c̄ soda carbon: were prescribed with the best effects; and, it may be said that no medicine seemed to suit his case for so long a time as the bitter infusion and soda, but even this lost its good effects ultimately. He then tried decoctum sarsaparillæ, which being taken at intervals was beneficial, but if drank daily for more than two or three days together, injured the tone of the stomach, and impaired the digestion; under which circumstances the irritation and discharge of mucus from the urinary organs invariably increased. Having thus directed all my attention to remove disorder of the digestive organs, and the digestion having become pretty good without so much improvement in the state of the urinary organs as I had anticipated, I was led to inspect the fæces. They were every way as healthy in appearance as possible, but there were whitish yellow patches observable upon them, that to me indicated

ulcerations in the rectum or colon. He found great variation in the state of the urinary organs, sometimes being quite comfortable, but in the space of half an hour after eating or drinking any thing which disagreed with him, he often experienced a sudden change for the worse, having then a perpetual inclination to make water, and more mucous discharge. I accounted for this by supposing that it resulted from the urinary organs sympathizing with the stomach, or else that the stomach being irritated, propagated by continuity of surface the irritation to the ulcers in the lower bowels, and that the irritation was thence extended to the urinary organs. A little soda or magnesia taken at such times afforded immediate relief occasionally, but at other times no good resulted from taking either of those remedies.

Sometimes he found this irritation come on after eating the plainest and most wholesome food, which convinced me that at such times he ate too much. He then resorted to milk again, and was dieted still more strictly. For his breakfast and supper I

limited him to one dry biscuit, and rather more than half a pint of milk for each of the above meals, and he was desired to be very moderate at his dinner; o abstain from all kinds of seasoned meat, and to eat none but the very plainest kind of food. Twice or thrice a week he took *pilula hydragryri c̄ opio hora somni*, and the following morning a saline effervescing draught, or a small quantity of *oleum ricini*. These means preserved the digestive organs uniformly in a tolerably good state. The fæces were carefully watched, and the patches of pus which appeared upon them grew less and less, and regularly as this took place, the irritation in the bladder, and the discharge of mucus, diminished. At last the mucus ceased to appear, and the urine was of a healthy colour and smell, by which time, or very shortly afterwards, no pus could be seen on the fæces. The patient had then nothing to complain of but a too great frequency of voiding his urine; there was no unusual irritation accompanying it, so that I conceived it might be the result of long habit, or that it was owing to the bladder's being contracted in

consequence of so much time having elapsed since it was properly distended. This being suggested to him, he tried to hold his urine a longer time, and then found that he wanted to void it less and less frequently, and more came away at a time, till at last he considered himself to be in perfect health.

The mucous discharge and irritability of the bladder, in the foregoing case, appeared to have been kept up very materially by the ulcerations in the lower bowels. I have, however, no doubt that disorder of the digestive organs had also a considerable share in disordering the bladder, as well as being the sole cause of the ulcerations in the bowels. But whatever operated chiefly to disorder the bladder, the result of the case shews, that the cure rested wholly upon the use of such means as prevented irritation in the stomach and bowels.

OF IRRITABLE BLADDER, WITH MUCOUS
DISCHARGE, IN CONSEQUENCE
OF INJURIES OR DISEASES
OF THE SPINE.

It has already been mentioned that vertebral affections may produce irritability of the bladder, and discharge of mucus from it, by acting through the medium of the digestive organs, but more particularly by disordering the functions of the bowels. The following is adduced as an instance of this description.

CASE.

A young man, twenty years of age, informed me, that about the latter end of April 1814, he began to experience a degree of paralysis in his lower limbs ; pain on the outside of his thighs immediately below the trochanters ; great frequency in making water, and always after emptying his blad-

der he had pain behind the pubes and in the glans penis. These symptoms increased until he lost all control over the lower extremities ; the rectum also became paralytic, but not the bladder, for he could always make water when he wanted, and he always had pain afterwards, as before mentioned. He very rarely had a stool without taking medicine, and if he allowed his bowels to become constipated, it invariably produced a constant pain in the bladder and glans penis, attended with involuntary discharges of urine and mucus every five or ten minutes : at such times he felt an acute pain come on in the bladder, and then a violent spasm which forced out all the contents. The quantity of mucus was great, being ten or twelve ounces a-day.

It was the 6th of September when I saw him : he was sitting up in a chair having a blanket wrapped round him, as he complained of being cold. He looked pale and emaciated, and had a small frequent pulse, and he told me that he felt as though he were dead all below his hips. He had passed

no stool for three days, and his bladder was at this time in the worst state which has been described. Six ounces of urine had been saved for my inspection : it was high-coloured, and consisted of about one-third part mucus, which was so thick and tenacious, that the end of a stick entangled in it enabled me to elevate nearly the whole quantity. The mucus was of an opaque yellowish white appearance, and seemed to have a whitish powder mixed with it, but did not feel gritty under the finger. The urine and mucus together smelt peculiarly offensive ; very ammoniacal. The lowest of the lumbar vertebræ yielded under pressure, and gave him pain, so that I concluded it to be diseased. He took very little nourishment, principally tea and bread and butter, and sometimes a little ale. I recommended him to leave off the tea and ale, and to have bread and milk morning and evening, and animal food in the middle of the day.—Sumat olei ricini ʒi ʒss.

Sept. 7.—The castor oil had operated three times, and the fæces were nearly

black. Upon the whole he felt rather better ; passed his urine less frequently, with less pain, and more at a time, but the proportion of mucus was equally great. I applied a caustic near to the diseased vertebra, and advised great attention to cleanliness, for him to use fomentations about the pubis and perinaeum often, and to go into the warm-bath once or twice a-week. The bowels were to be kept regular by means of *oleum ricini*. He was to have *pulv : ipecac : comp : pro re natâ*, and a dose of *uva ursi* twice a-day.

Sept. 12.—He felt much stronger, had a good appetite, slept soundly, and was free from pain. He voided his urine less frequently, and the quantity of mucus it contained was small compared to what it had been ; it was altered in appearance, being quite white, and it smelt less offensively. I poured the urine away from it, and added about a pint and a half of water : the mucus mixed with the water imperfectly, even when stirred together ; it appeared in shreds, and separated immediately on being allowed to stand still. When the water

was poured away the mucus had little or no smell. At this time he made water about an once in half an hour, and he could restrain the flow till he had procured a vessel to receive it ; and the whole quantity of mucus that had come away during the last twenty-four hours did not exceed an ounce. He was cheerful, and sat up to amuse himself with writing.—The uva ursi was changed for pulv : calumbæ c̄ kali vitriolato, et pulv : aromat : bis die. In other respects precisely the same plan of treatment was persevered in.

Sept. 20.—He was still further improved in health ; he passed his urine comfortably, and it contained no mucus. The same treatment was continued. This was the last time of my visiting him ; but a month afterwards, *i. e.*, on the 20th of October, I was told they had been careful to preserve his bowels regular ; that the bladder performed its office naturally ; his urine was healthy, and free from mucus, and that he had been in this state ever since I saw him.

CASE.

A fine, stout, muscular young fellow, slipt while at work, and, falling from a great height, broke his back : he was carried home to his mother's house, and I was requested to see him. I found the injury situated about the lowest of the dorsal vertebræ, and of course all the parts below were paralyzed. Every thing possible was done for him, and he survived the accident quite as long as patients generally do under similar circumstances ; that is, about one year and a half. But the only part of his case which will prove interesting here, is that which relates to the state of the urinary bladder. From the time of his meeting with the accident, it became necessary to take away his urine by the catheter, and he suffered severe pain in his bladder if it was not emptied night and morning ; and sometimes the catheter was obliged to be employed every three hours, to preserve him free from pain. During the first three weeks, the urine remained tolerably healthy in appearance, but after that time it began to be accompanied by glairy

white mucus, which felt gritty under the finger. The mucus was so thick, it would pass only through a large catheter which had large eyes to it. The calculous matter in this mucus was frequently in pieces of the size of pins' heads, and sometimes I have picked out a piece nearly as large as a grain of wheat. It could not but happen that the bowels would be very irregular in discharging their contents, and, that several days sometimes passed without his having a stool, notwithstanding he had been taking powerful cathartic medicines, and then it was his bladder always discharged the largest quantity of mucus, and often became so irritable, that it would contain no urine without giving him pain, and often would expel it as fast as it was secreted into it. But when the bowels were effectually relieved, the mucus diminished considerably ; sometimes nearly disappeared ; the urine became almost healthy, and then always required to be taken away by means of the catheter. Occasionally the bladder was so irritable, that very little distention of it gave him great pain ; then his urine was drawn off

very frequently, and he always expressed himself as being greatly relieved, although not more than two or three ounces of water came away. It was constantly observed from the beginning to the end of this case, that the state of the bladder varied with the state of the bowels; when they performed their office well, the bladder did the same. He tried every kind of cathartic medicine, but none produced a proper effect many days together, but that which appeared to benefit him most by preserving the bowels regular, was pills composed of *guaiacum sapo hispanensis*, *sodæ carbonas* et *oleum : juniperi*; *oleum ricini* also proved a most valuable remedy in this instance.

CASE.

The following is another example of diseased spine causing irritability of the bladder, with mucous discharge. I was desired to see an apprentice boy sixteen years of age, on account of a swelled knee. A physician had attended him about two months for symptoms of consumption.

While I was examining the joint I noticed a strong smell of urine, which led me to inquire how he made water, and he told me that he could not retain it a single moment, and that it was constantly running from him. Laying my hand upon his abdomen, he complained of great tenderness; it was tense and swollen as in ascites, which convinced me that he had retention of urine. I sent for the catheter, and introduced it as the boy sat on the side of the bed, for he was too weak to support himself standing. Upwards of six half pints of water came away, and then the instrument was withdrawn in consequence of its being plugged with mucus. From this time the urine was taken away night and morning, as the bladder was incapable of expelling a single drop by the natural efforts. A large quantity of glairy mucus always followed, and it was so thick that it would only pass through a large instrument, having large eyes. The use of the catheter relieved him from a good deal of pain in the lower part of his belly, but in ~~other~~ respects he got no better. The cough and difficulty of breathing were if any

thing worse. Ultimately he lost the use of his lower extremities, and on examining his back I found disease and curvature of the sixth and seventh dorsal vertebræ. His bowels were very irregular, often not being moved for two or three days together; and, when they did move, it was so violently as rendered opiates necessary to restrain the purging; and when the bowels were in this disordered state, he always suffered additional pain in his bladder. Being incapable of voiding any urine without the catheter, he was anxious to have it used frequently, and always expressed himself as being greatly relieved by it. Indeed, although there was so much irritation as to create a deal of pain, the bladder was so completely incapable of contracting as to render it needful to press with the hand above the pubes to get away the urine, even when the catheter was introduced, and once that I happened to remit this pressure, a quantity of air rushed down the instrument into the bladder. I could feel through the integuments of the abdomen that the bladder was very much thickened, and so perfectly flaccid that it

felt like a wet leather bag. Caustic was applied on each side of the diseased vertebræ, and every possible attention was paid to benefit his general health. In about three weeks after putting on the caustics the boy hady haiderably improved ; he eat and did of heartily ; he gained both flesh and stroller ; and, so far recovered the sense of feeling in his lower limbs, as to know when any body touched them, but he had no power to move them. The bladder regained its contractile power, and became so irritable it would not retain more than three ounces of urine ; for, when it contained that quantity the patient was annoyed by involuntary expulsions of it every few minutes. I now began to hope the boy would get well, but these favourable symptoms did not continue above a fortnight longer, for he was then attacked with pain in the region of the right kidney ; his general health declined ; the bladder again became perfectly paralytic ; no urine passed without the catheter being used, and there was a deal of both mucus and pus discharged at the same time, which latter I supposed to come from the right kidney.

All his complaints increased ; he grew hectic, and died.

It will have been observed in these last three cases, that although the bladder may be supposed to have suffered an equal degree of irritation in all, yet it possessed different degrees of contractile power, which I imagine admits of being explained by the different part of the spine which was affected in each case. The action of the bladder is partly voluntary, and partly involuntary. The voluntary power, there can be no doubt, is derived from the medulla spinalis ; therefore the disease being, in the first case, situated in the last lumbar vertebra, the voluntary power was greatly impaired, but not entirely destroyed ; for the spinal disease being so very near to the bladder, the latter could obtain some small share of nervous influence from the nearest healthy part of the medulla spinalis ; but, in the other two cases, where the injury of the spine was at a greater distance—too far off to admit of any nervous influence being sent to the bladder, in a direct course from the nearest perfect part of the spine—

then the patients lost every degree of control over the actions of the bladder. The involuntary power of the bladder must be derived from the pelvic and abdominal ganglia ; and as the power which is given out by these ganglia depends very much upon the state of the medulla spinalis ; so, in proportion as the disease happens to be situated low in the spine, the more nervous influence will be secured to the abdominal and pelvic ganglia, and *vice versâ*. Thus may be noticed in these three cases a degree of involuntary power in the bladder, proportioned to its distance from the seat of disease in the spine.

OF IRRITABLE BLADDER, WITH MUCOUS
DISCHARGE, IN CONSEQUENCE OF
STRICTURES IN THE URETHRA,
OR DISEASE OF THE PRO-
STATE GLAND.

THESE are both of them frequent causes of irritable bladder, with mucous discharge, and it might be proper to introduce some cases of this kind, but I think it unnecessary, because such are commonly to be met with in almost every work professing to treat of strictures and prostatic diseases. I shall therefore content myself with observing, that the successful treatment of these cases depends upon the use of means most suitable for the cure of the strictures, or of the prostatic disease, the consideration of which does not properly come within the limits of this essay*. There is, however, one circumstance which deserves to be no-

* See Practical Essays on Strictures of the Urethra and Diseases of the Testicles, &c. &c. by the Author.

ticed in this place, because it more particularly concerns the disease of the bladder. When enlargement of the prostate gland prevents the perfect evacuation of the urine, the greatest attention should be paid to remedy that, by the introduction of the catheter, as often as necessary. For if the diseased bladder be not protected from the constant irritation of the retained urine, the combined use of all other means will never be sufficient to restore the patient to health.

ON INFLAMMATION OF THE BLADDER.

THIS is denoted by tumor, and burning pain in the hypogastric region ; tenderness both above the pubes and in the perinæum ; incessant desire to make water, with violent straining ; vomiting, tenesmus, and frequent pulse ; great restlessness, wild expression of the eyes, and occasional delirium, and sometimes retention of urine.

The tumor above the pubes will depend very much on there being or not being retention of urine, and this, again, will depend upon the state of the neck of the bladder ; because, if the inflammation be chiefly confined to the fundus of that viscus, then, most likely, there will be no retention of urine *. I find no author to have

* Mr. Desault contends, that the retention of urine in cystitis is occasioned by the inflammation of the corpus vesicæ preventing the contraction of the bladder ; and, in

mentioned the wild expression of the eyes, as symptomatic of cystitis, but as I once noticed it in a patient three or four days previous to his death, I consider it as indicating great danger; and on this account it ought to excite the greatest attention in the use of remedies, and will of course make the surgeon guarded in his prognosis. This case made the more impression upon me, because the gentleman who had care of the patient said he was doing very well—that the man was only frightened; and directed him to take a cordial medicine with *confectio aromatica*.

proof of this, he remarks that inflamed intestines are usually found distended. *Vide* 'Parisian Chirurgical Journal,' Vol. I. The following, however, appears upon reflection, to be the real state of the case. Slight inflammation renders the bladder irritable, and causes the urine to be discharged frequently; and the same effect results from violent inflammation, if it be confined to the mucous membrane of the bladder: but violent inflammation of the muscular coat of the bladder, makes it equally indisposed to contract or dilate, therefore it inclines to remain in the medium state—a certain portion of urine will consequently be retained, but so soon as a sufficient quantity collects to put the muscular fibres upon the stretch, they will relieve themselves by expelling a part. Thus, I believe, complete retention of urine will only accompany cystitis, as mentioned above, *viz.*, 'when the inflammation affects the neck of the bladder.'

Inflammation occurring in the bladder appears in all the varieties which mark it in other parts of the body, and has similar terminations by resolution, suppuration, and mortification. Should patients die while they have an inflammation of the bladder, the appearances that viscus must present will of course be different according to the degree and duration of the inflammation. If the inflammation be in the first stage, and have not existed long, then the bladder only seems to be more vascular than natural, but if it have existed for several years, instances of which are recorded in Dr. Hoffman's *Practice of Physic*, then the blood-vessels are sometimes found to be amazingly increased in size. Hoffman relates the case of a studious man, forty years of age, who suffered from inflammation of his bladder about six years; and when he died, some of the vessels were as large as a goose-quill.

Should the inflammation have been very violent, of short duration, and the patient have possessed strong health in other respects, then coagulating lymph may

be thrown out in considerable quantity upon the internal surface of the bladder; but this is rather a rare occurrence, because, as the lining of the bladder is a mucous membrane, the inflammation unless it be extremely violent, more readily relieves itself by secreting mucus or pus in large quantities; the suppurative stage of inflammation being much more easily excited on mucous membranes than the adhesive stage.

CASE.

An active strong old man underwent the operation of lithotomy; there was considerable difficulty experienced in laying hold of the stone, and a variety of forceps were introduced very many times, which rendered the operation extremely tedious. Four days afterwards I went with the surgeon to see this patient; the man laboured under the most violent symptoms of cystitis that can be imagined, his countenance betrayed extreme anxiety, and there was great wildness of his eyes. Three or four days after this the man died. The gentleman who attended the case said, that

upon examination he found all the vessels of the bladder gorged with blood, and its internal surface lined with a thick coat of coagulated lymph.

It will be readily understood from what has been said a little above, that inflammation of the bladder may terminate in suppuration, without any thing more to be observed in it than increased vascularity. About nine years ago, however, I had an opportunity of examining the bladder of an old gentleman who had suffered a long time from some disease in his urinary organs, and had at the time of his death inflammation of the bladder, and discharge of pus from it. In this case the internal membrane had an appearance very similar to that which the external orifice of the urethra presents during the most violent stage of gonorrhœa.

Morgagni mentions two cases of sphacelated bladder, and a third is related by Dr. Hoffman. Mortification of the whole bladder seldom occurs; but in patients who die from retention of urine, it is not unusual

to find a spot or two in a sloughy state, as that constitutes the first part of the process by which nature commonly makes way for the urine to escape into the cavity of the abdomen, or into the surrounding cellular membrane.

I have a bladder in my possession, shewing a slough about the circumference of a shilling, which had formed near to the place where the right ureter entered. .

ON THE CAUSES OF INFLAMMATION OF THE BLADDER.

INFLAMMATION of the bladder may result from a variety of causes; almost any thing capable of producing inflammation, of the rest of the abdominal and pelvic viscera may have that effect upon the bladder. The irritation of calculi, mechanical injuries, a constipated state of the bowels, retention of urine, and inflammation extending from the adjoining parts are the most frequent causes. It has sometimes been occasioned by the use of very violent diuretics, more particularly by cantharides. The author of the article cystitis in Parr's Medical Dictionary says, that he has once known it produced by exposure to cold.

ON THE TREATMENT OF CYSTITIS.

ACCORDING to the nature of the inflammation that affects the bladder, the treatment of it must be varied. If the symptoms be violent; have been brought on suddenly; if there be much sympathetic fever, and the pulse be full, strong, and frequent,—then the inflammation is what is termed acute, and all those means which are called anti-phlogistic remedies will be more or less suitable. Bleeding from the system, however, is seldom necessary; the application of leeches to the perinæum, and cupping on the loins or over the sacrum, almost always prove sufficient; and, when this will suffice it is preferable, because topical bleeding affords more relief to the part in proportion to the quantity of blood that is taken away, than is experienced from venesection. But, if the saving of time

be an object of great importance, as for instance in case of acute inflammation of the bladder, attended with retention of urine, in which case it is indispensably necessary to remove the water as speedily as possible, then, as bleeding is employed to facilitate the introduction of the catheter, venesection ought to be preferred, because it is most speedy in its operation. Venesection ought also to be performed if cystitis be accompanied with peritonitis. Evacuating the bowels freely should never be omitted in inflammation of the bladder, but this should be done by those purgatives which excite the least irritation. *Oleum ricini* is one of the best that can be chosen for this purpose; another, which is equally good, is a mixture composed of *antimonium tartarizatum*, manna, and *magnesia vitriolata*, with *magnesia alba*; a dose of *hydrargyri submuriæ* is also generally proper; but, as the *hydrargyrus* given alone is liable to irritate the rectum, it is often well to join with it a little *pulvis antimonialis*, or even a small dose of opium. There will be no reason to fear that the latter will delay the operation of the ca-

thartics, for I could mention some instances of its having the contrary effect. This, however, will depend very much upon the relative proportion of each article, and upon the manner of following them up with oleum ricini, or cathartic mixture. If we wish to procure stools speedily, we should not give more than a grain or a grain and a half of opium, and, probably only half a grain may be the better dose; and, a dose of oleum ricini or some other liquid cathartic should be administered very soon afterwards, and repeated at short intervals, perhaps every hour till the bowels act. Without these directions are attended to, so as entirely to correct the stimulant and constipating properties of the opium, it is the very worst remedy which can be given in any case of acute inflammation. Emollient enemas have an excellent effect, not only in facilitating the operation of purgatives, but also by acting as an internal fomentation. They allay the violence of the actions in the inflamed parts, by exciting the most copious secretions from the adjoining bowels, without adding the slightest degree

of irritation. I would, however, recommend them to be used in much larger quantity than is commonly done; three pints or two quarts of plain warm water, or decoctum avenæ should be injected at a time, and by thus distending the whole colon, I have known fæces brought away which had lodged there for weeks, and resisted the operation of strong purgative medicines. Fomentations should also be applied over the pubes and to the perinæum; indeed the patient had better not be without them for a single moment, so long as his symptoms continue unabated. But the fomentations by means of flannel wrung out of hot water, must not be allowed to supersede the warm bath; for, if there be one disease more than any other in which the warm bath proves serviceable, it is inflammation about the neck of the bladder. When plentiful evacuations have been procured from the bowels, and the urine is got away, the violence of the symptoms will be considerably mitigated. The patient should then keep quiet in bed, and take saline draughts in a state of effervescence; —the fomentations should be renewed

frequently ; and the hip-bath resorted to night and morning, or oftener, if the pain continues severe.

CASE.

A young gentleman, eighteen years of age, and of a very full habit of body, contracted a gonorrhœa. He was accustomed to high living, very improperly so, and particularly in the drinking of wine ; but as he resided with his parents, he could not be persuaded to diminish his usual allowance, for fear of exciting a suspicion of his disease. A frequent desire to make water, and difficulty in voiding it, came on gradually ; and one evening, after enjoying the pleasures of the table along with a party of friends, he was attacked with a complete stoppage of urine. This having lasted twelve hours, was attended with the most urgent symptoms. There was a most distressing desire to empty his bladder, accompanied by extremely violent involuntary straining efforts, but not a drop of urine could be expelled. There was tumour in the hypogastric region, and also

great pain and tenderness ; the sympathetic fever ran high ; he had a full hard throbbing pulse, a flushed countenance, and every symptom of much blood being determined to the head.

A catheter was introduced, and afforded great relief, by drawing away a pint of high-coloured urine. Ten ounces of blood were taken from the arm, and eight leeches applied to the perinæum. He was ordered to take a dose of hydrargyri submurias, and repeated doses of oleum ricini ; to go into the warm-bath, and to use fomentations constantly to the pubes and perinæum. This happened on a Friday morning. In the evening of the same day he had been well purged, and was something easier, but his distress seemed to arise principally from the urine being retained : he had not passed any since being relieved by the catheter ; it was again used, and brought away a pint and a half of water. The warm-bath was repeated, fomentations were applied unremittingly and he took effervescing saline draughts. On Saturday morning he was again distressed with re-

tention of urine ; and the catheter brought away a pint ; in all other respects he was improving, and continued the same remedies. In the evening he was better, but still had retention of urine ; the symptoms, however, were not urgent, although he had not voided a single drop of water in the course of the day : the catheter found eight ounces in the bladder. The same treatment was persevered in : he passed a tolerable night, and began to void his urine naturally the next morning ; after which the case went on prosperously.

At the time of writing this, I am of opinion that the patient would most probably have suffered less, if the catheter had been passed oftener during the first twenty-four hours ; say every six or eight hours, instead of only night and morning. It will be seen that the bladder contained one-third more urine at the second time of using the instrument than it did in the first instance. The inflammation caused retention, but the irritation, which would be in proportion to the quantity of urine, would aggravate the inflammation, and the

latter would proportionally increase the sympathetic fever. If, therefore, the urine had been taken away oftener, the local inflammation would have been subdued sooner, and so much the more quickly would the constitutional disturbance have been allayed.

Some observations having already been made on the management of the patients after the most urgent symptoms of cystitis have been removed, it only remains for me to add, that all those means which are comprehended in the term antiphlogistic, generally prove useful, but the application of them must vary, in some degree, to meet the peculiarity of particular cases.

When patients have long suffered from irritable bladder, attended with a discharge of ropy mucus, they may be said to have chronic inflammation of that viscus; but these cases have already been considered.

Sometimes, however, it happens, that this chronic inflammation of the bladder is converted into acute inflammation, and so long as that state lasts, it must be

treated, according to the existing symptoms, upon the same general principles which have been laid down for the management of acute inflammation.

It may, however, be well to remark, as these cases sometimes occur in old patients of bad constitution, that in such we must be much more cautious of employing the lancet; because inflammation, under these circumstances, is generally dependant upon irritation with actual want of power in the system, so that the loss of blood can ill be supported; the chief means of relief must therefore consist in removing that irritation which has brought on the increase of the symptoms. Attacks like these result from the irritation of a calculus in the bladder; sudden exposure to cold; a deranged state of the stomach; improper eating and drinking; a disordered state of the bowels, in consequences of accumulated fæces, or else from the local stimulus of urine long retained by painful efforts after a desire to void it has come on. Accordingly, as one or more of these causes have operated, the subsequent treatment,

after the bladder has been emptied, when there has been retention of urine, must vary in such way as may appear to be best calculated to keep off irritation, and restore tranquillity and health to the whole system.

The most complete instances of chronic inflammation of the bladder are, I imagine, to be met with in patients who have long suffered from retention of urine; in such persons the vessels of the internal coat of the bladder are sometimes so gorged with blood, that I have seen the whole surface have a black appearance, which in part, no doubt, proceeded from extravasation having taken place. I once attended a patient who had for some years suffered from partial retention of urine, in consequence of disease in the prostate gland; and I am inclined to think the inner membrane of the bladder was in the state just described, because, for many days after I begun to use the catheter upon him, his urine appeared to be bloody whenever the instrument seemed to rub against

the bladder ; but this effect did not follow, when, as I supposed, the bladder was become healthy. So far as these cases are owing to irritation of retained urine, we have only to guard against that by the use of the catheter night and morning ; and this will suffice for their cure.

OF RETENTION OF URINE.

SOME authors have written that retention of urine is a disease of great urgency and danger, but this is not correct; for, strictly speaking, it is no disease at all. It often is the effect of disease, and it often is a cause of disease, but, as before stated, does not of itself constitute a disease. Retention of urine sometimes comes on suddenly, under which circumstances it is generally most complete and most alarming; for, unless it be speedily remedied, it runs its course, and terminates the life of the patient in a few hours, although, perhaps, there may not be more than a pint of water in the bladder. An instance will be related, which ended fatally in twenty-seven hours. At other times it comes on gradually, and being incomplete, and only a small portion of the urine which is daily secreted being retained, the bladder slowly

dilates to accommodate itself to the urine, and, as the bladder enlarges, more and more fluid is retained ; in this state patients may continue some years, the bladder increasing in size all the time. I have at one operation, taken, ten half pints of urine from a patient, who I am certain had not emptied his bladder for more than two years : and there is one instance upon record, of a young woman having her bladder enlarge to such a degree, that when a catheter was introduced, eighteen pints of urine were drawn away.

It is well known, that when there is a complete retention of urine, and the bladder is quite full, a stop is put to further secretion, and this effect has been thought to proceed from the mechanical pressure of urine against the mamillæ of the kidneys. Possibly this may happen in some instances, but I do not think it does generally. I am inclined to believe that the suppression sometimes takes place in consequence of a retrograde sympathy between the bladder and kidneys ; and I was led to this opinion, from reflecting upon a case of a

gentleman, who had ischuria renalis of both glands, in consequence of irritation resulting from a calculus passing down one of the ureters. I have met with a similar case in some periodical work, but cannot at this moment recollect where. Morgagni, however, speaks of such cases as though they were not uncommon. Again, too, when irritation exists about the neck of the bladder, if it be violent, we very commonly find the quantity of the urine greatly diminished without any being retained in the bladder. Diseases of the prostate also often lessen the secretion of the urine. In all these instances, the urinary secretion can only be influenced by nervous sympathy.

I imagine there exists the same kind of retrograde sympathy between the bladder and the kidneys, as there does between the intestines and stomach. Thus, if any part of the passage through the bowels be obstructed, whether it be from hernia or accumulated hard fæces, vomiting is excited, which certainly shews an indispo-

sition in the stomach to perform its natural function.

If retention of urine be not relieved by art, it generally proves fatal; but this result does not invariably happen, for sometimes the bladder gives way posteriorly, and the urine is discharged into the rectum, and thence evacuated per anum. At other times the urine is effused into the cellular membrane of the perinæum—an abscess forms and bursts externally, after which the wound becomes fistulous, and the urine is voided through it continually. More usually, however, when the urine escapes into the cellular membrane, it produces extensive sloughing and death; and it is equally fatal, if the bladder happens to give way in such a direction as to empty the urine into the cavity of the abdomen.

This expression—*the bladder gives way*, requires some explanation, otherwise it might be imagined, that the bladder, lacerated in consequence of over distention,

but in truth this never occurs. A small spot first mortifies, then a separation takes place between the dead and living parts, by means of an ulcerative process, which affords an opportunity for the urine to be effused.

It must not, however, be supposed that retention always proves fatal by rupturing the bladder, for I have examined two patients who died from retention, in both of whom the bladder was perfectly sound. Similar instances are described in the writings of Morgagni. When the bladder does not rupture, the patients are commonly observed to die in a comatose state, and this has been thought to result from the translation of urine to the brain, but I have ascertained that the coma is entirely owing to an inordinate determination of blood to the vessels of the head, and this possibly may be the immediate cause of death in some patients. I am, however, thoroughly convinced that some patients die from suffocation, in consequence of the air cells of the lungs becoming filled with frothy fluid. The immense quantity of frothy fluid

which I have seen patients under these circumstances throw out, at every expiration, for two or three hours before their death, convinces me that the air which they inspired never could have had proper access to the blood in the lungs, and this was further evinced by the livid appearance of the countenance, but more particularly of the lips ; at the same time the patients, though insensible, made the most laborious efforts to draw air into the chest : the inspirations were deeper and fuller than I ever observed them under any other circumstances. The following is a most remarkable instance of this kind.

CASE.

One Saturday night I went to see a middle-aged muscular man, who was usually costive in his bowels, but otherwise enjoyed the most vigorous health. He lay stretched out on the bed, and was perfectly insensible. His countenance betrayed the strongest imaginable indications of congestion in the brain ; it had an

idiotish look ; the eye-brows were elevated ; the eye-lids were partly closed ; the eyes were fixed, turning upwards, and the pupils were contracted ; the mouth was a little open, having its corners drawn down ; the whole face was exceedingly flushed, and all the surface of the body felt very hot and dry. He took such very deep inspirations that they might be compared to sighs ; his pulse counted 120 in a minute, and beat fuller and harder than any pulse that I had previously felt, and the actions of the heart were so extremely violent as to shake the whole frame. This happened so distinctly that I am certain I could have stood several yards from him and have counted his pulse, merely by watching the motions of his head.

His wife informed me, that for ten or eleven days he had constantly complained of the most distressing head-ach and an unconquerable disposition to sleep ; and, the stools which he had passed were all hard and perfectly black, but that he had voided none for three or four days ; that when he awoke he usually ate and

drank heartily, and then fell asleep again ; that about twelve hours before my seeing him he had taken for breakfast half a pound of beef-steaks, with ale and several glassfuls of gin, and had made a tolerably good dinner in the middle of the day.

I inquired how he made water, and his wife replied very well, and assured me that she had seen him void a pint or more of colourless urine at one time that very day..

Having satisfied myself thus far, I struck my lancet into one of the temporal arteries, and opened also a vein in the arm, and having obtained about 40 ounces of blood, the patient appeared greatly improved ; his breathing became natural ; his face was but little flushed, and felt cooler ; he opened his eyes ; recognised his brother and one of his friends ; put up his hand and rubbed his face ; told me he was much better and not so sleepy, and assured me that the candles were not unpleasant to his eyes. His pulse still beat very strongly, but were sunk to 96 in a minute. He drank a tea-

cupful of lemonade, and took a pill containing a full dose of *hydrargyri submurias et pulvis antimonialis*, and was ordered a draught of *infusum rosæ c̄ magnesia vitriolata* every hour. Cloths wet in cold water were to be kept constantly round his head, and he was to be supported by means of bolstering, so as to preserve him in a sitting posture. This happened about eight o'clock in the evening, and his wife sent me word about ten o'clock that he continued in the same state as when I left him. I then gave particular orders for them to call me in the middle of the night if he became sleepy again, but they did not send till the next morning, at which time he was dying. He was sitting up in bed as when I had left him; his face was more of its natural colour, but the lips were livid; the eyes were closed; I opened one and saw the pupil was rigidly contracted; on a candle being held before it the eye gently moved, but I could not ascertain if it was a voluntary motion. Every now and then slight twitchings or convulsions affected the muscles of the face, neck, and shoulders. He was in a perspiration, and

felt warm all over his body. Pulse 98 in a minute, but less full and not so strong as before. He seemed as it were almost to gasp for breath, for, although he drew in very deep and full inspirations, his manner impressed me with an idea that he wanted more air. As he breathed, the air made a noise as if forcing its way through frothy mucus, and when he expelled air from his lungs, such vast quantities of frothy fluid accompanied it as to completely pour from his mouth and both nostrils.

The attendants told me that he had remained quite sensible till about twelve o'clock, soon after which he ceased to speak ; and, from about four o'clock he had frothed at his mouth. But they assigned no reason for not sending to me sooner. The blood which had been preserved was extremely buffy ; was very much cupped, and of firm texture.

The twitchings of the muscles of the face, &c. &c., and the peculiar breathing with discharge of frothy fluid, made me suspect some disease in the urinary organs,

and I wished to introduce a catheter, but having none with me was obliged to return home, and before I could get to him again he died.

Permission being obtained to examine the body, I noticed the following appearances.

An amazing deal of blood escaped on making an incision through the scalp across the top of the head, and in going round the cranium with the saw, it accidentally wounded one of the lateral sinuses, when the quantity of blood which poured forth was so astonishingly great, that were it to be estimated, I fear many persons might think it incredible. So much draining must necessarily have prevented the large veins of the cerebrum from appearing turgid, but all the other vessels were perfectly gorged with blood. The whole substance of the brain felt remarkably firm, and the medullary part instead of being of a clear white, had rather a brownish tinge, owing to all its minute vessels containing so much blood.

If a portion of the medullary part of the brain was pressed, blood exuded from almost every point. Serum filled all the ventricles, but not to distend them, and both the plexus choroides and velum interpositum were exceedingly tinged. On lifting the brain from the base of the skull and dividing the optic nerves, their central arteries bled several drops. Both kidneys bore evident signs of having been inflamed. The bladder appeared to be perfectly healthy; it contained a little more than a pint of limpid urine, which distended it to feel tense as a drum-head. A stricture in the urethra obstructed the flow of urine so completely, even when all spasm must have ceased, that it was with the utmost difficulty I forced the finest imaginable stream from the end of the penis. Thus the bladder had not given way, no part had mortified, neither had any vessel ruptured in the brain.

All the circumstances of this man's death being taken into consideration, along with the appearances which the parts had upon dissection, I am led to conclude that

the immediate cause of his death was suffocation, which may be thus explained. The rapid and violent manner in which the blood circulated, occasioned it to pass through the lungs faster than it could be properly oxygenated, and at the very time that there was this additional demand for oxygen, there actually existed less power to obtain it, because the capacity of the air-cells must have been diminished by the inordinate quantity of blood sent to them to be oxygenated, and the unusual quantity also which must have circulated in the nutrient arteries of the lungs themselves. Again, too, as the kidneys, the skin and the lungs, are all engaged in the same function, it happens that, as the excretion from any one of these parts is diminished, nature always procures relief by increasing the secretions of the others ; hence, in this case, as the perspiration from the surface of the body, and the urinary secretion, were both suppressed, nature sought relief by increasing the exhalation from the lungs, which being poured forth in larger quantity than could be conveyed off by the breath, it accumulated in the air-cells

till it was ultimately worked up into such a large quantity of frothy fluid as produced suffocation.

His wife committed a great error, by informing me that her husband made water very well ; and another circumstance that helped to lead me from the case was, that I recollected attending the same patient in the previous year, on account of violent headach, great determination of blood to the head, and a most obstinate hemorrhage from both nostrils, of which he was cured by purging.

I believe there is upon record no case parallel to this, for the shortness of its duration, as it terminated fatally in twenty-seven hours from its commencement ; and it is a remarkable instance to shew how much disorder of the urinary organs operates to produce congestion in the vessels of the brain.

It has been thought that some patients, labouring under retention of urine, are relieved by vicarious secretions. I have just

explained how this may happen in some small degree, either by perspiration or exhalation from the lungs ; and my own experience would lead me to believe that it never happens in any other way ; but mention has been made by very respectable authorities, of patients, during retention of urine, having urinous perspirations, and the odour of urine emitted from the mouth. I will not venture to deny that either of these do occur, and much less the possibility of their occurring, but in every instance where I have noticed a urinous odour about the patient, I have always been able to ascertain that it proceeded from urine which had escaped from the penis, and lodged in some part of the bed or clothing.

Morgagni relates some cases of retention of urine, that were relieved during a long period by the daily vomiting of a fluid from the stomach, which fluid had the taste and smell of urine, and which he believed to have been secreted by the stomach ; but I am inclined to think, that, if there was no deception in these cases, the

enlarged bladder had formed some adhesion with the intestines high up in the abdomen, or, perhaps, with the stomach itself, and that ulceration had subsequently established a communication between the two organs, so that real urine passed upwards into the stomach, and was thence rejected by vomiting. But if this did not happen, then, I imagine, we must suppose an inverted order of absorption, according to Dr. Darwin's ingenious theory, whereby he endeavours to account for diabetes, by saying that the absorbents of the bladder take upon themselves an inverted action, and receiving the chyle from the absorbents of the bowels, convey it to the bladder. Now, if it be possible for the absorbents of the mesentery to have an inverted action, then, if the absorbents of the bladder were to carry urine to them while they were in this state, real urine most certainly might be discharged from the mouth.

ON THE SYMPTOMS OF RETENTION OF URINE.

RETENTION of urine may generally be known to exist, by there being a painful and urgent desire to make water, and violent, but ineffectual efforts, at intervals, to empty the bladder. There is tumor in the hypogastric region, and tenderness on pressure. The distended bladder may also be felt by a finger in the rectum, and if pressure be at the same time made with the other hand, above the pubes, percussion will be perceived. There is often accompanying fever, with a full, hard pulse. Sometimes there is an amazing determination of blood to the vessels of the head, and flushing of the face, and then I have always met with a peculiarly full, strong, rolling, and rapid pulse. In the latter stages of this complaint, patients are often comatose, and have slight convul-

sions ; and, when not comatose they sometimes have vomiting and hiccup, which last symptom is very bad, as it commonly indicates mortification. The symptoms of fever are such as generally occur in common inflammatory cases, but having continued a certain time, they change to those which are seen in the worst stage of typhus, particularly the dark-brown dry fur upon the tongue, and the dry brown sordes upon the teeth and lips. These latter symptoms so generally prevail after the system has been for a certain time oppressed with some matter which ought to be evacuated, such as pus, fæces, or urine, that they have been termed symptoms of retention. Of course the violence of the fever will be very much dependant upon the strength of the patient.

It rarely happens, but that the distended bladder can be felt from the rectum, yet this may be prevented by enlargement of the prostate gland, beyond which the finger cannot reach. Some instances have occurred of surgeons mistaking the enlarged prostate for the bladder ; and, it may be

right to state, that I have known one case where the distended bladder could not be felt from the rectum so satisfactorily as usual, owing to its having risen from the pelvis up into the abdomen, like what happens to the gravid uterus. Mr. Abernethy has remarked the same, and assigned it as one of the reasons for puncturing the bladder above the pubes. The inability to void the urine in cases of retention, varies exceedingly ; sometimes the most violent efforts will not expel a single drop ; in other instances part of the urine can always be voided, and in some cases the patients make as much water daily as though no retention existed, and sometimes the patient so far from appearing to have retention of urine, seems to have incontinence of it, for it escapes from the bladder as fast as it is secreted. These circumstances must be carefully remembered, otherwise the patients may be thought to have strangury or incontinence instead of retention of urine.

The least fallible symptom of retention of urine is the tumor and tenderness above the pubes ; this, however, sometimes is

rendered rather obscure in very fat patients, and I once knew a very able surgeon lay his hand upon the hypogastric region of a thin patient who had retention of urine, and declare that in his opinion there was very little fluid in the bladder; but, on a catheter being passed, eight half pints of water escaped. I have made these remarks to shew that some little care is necessary in feeling for the bladder above the pubes, which has not hitherto been pointed out. It is the apex of the fundus of the bladder which turns forward and pushes against the integuments of the abdomen, when it is distended with urine. If there be no great quantity of urine in the bladder, it may be felt in the hypogastric region, but in proportion as the quantity of urine increases, the fundus of the bladder rises higher and higher, till I have seen it bulge forward or point close to the umbilicus.

ON THE CAUSES OF RETENTION OF URINE.

THESE are of two kinds, either the want of expulsive power in the bladder, or some insurmountable obstruction that prevents the flow of the urine. The want of expulsive power may be either a total paralysis or mere loss of tone, in consequence of the detrusor muscles having been sprained. The mechanical obstructions may be numerous, such as spasms and inflammation of the sphincter vesicæ, or of the membranous part of the urethra ; a coagulum of blood or stone in the bladder ; a calculus lodged in some part of the urethra ; strictures of that canal ; diseases of the prostate gland, or some imposthume forming near the anus.

The foregoing may be said to include all the immediate causes of the urine's being retained ; but, as it will be found when

we come to consider the treatment of retention of urine, that it will consist very much in removing the immediate causes of it, so it may perhaps be well to mention in this place the remote causes, or those things which bring the immediate causes of retention of urine into action. Mere spasm of the urethra or of the sphincter vesicæ, often results from the use of cantharides, either when employed to raise a blister on the surface of the body, or when taken into the stomach; and precisely the same effect may result from fever, disorder of the bowels, injuries of the spine, fractures or dislocations of the lower extremities or from irritating strictures, by the necessary introduction of bougies; and it is very possible for the same causes operating for a longer continuance to be also productive of inflammation, and this is very likely to occur if there happens to have been some previous disease in the urethra or prostate gland.

The application of lunar caustic to strictures in the urethra, has very frequently occasioned so much spasm and inflam-

mation as to be productive of retention of urine, and the same effects have occasionally been brought on by the use of improper injections for the cure of gonorrhœa. Fever, disorder of the bowels, and injuries of the spine, have also other effects beside those mentioned above; they sometimes operate to induce retention of urine by causing paralysis of the bladder, or want of irritability in it; and, I am inclined to think that fever, particularly of the typhoid kind, is much more frequently productive of retention of urine than is generally imagined. A friend has informed me that the late Dr. Clark of Newcastle-upon-Tyne, had so very often found this to happen, that in the latter part of his practice he never went to see a fever patient without examining the state of the bladder, by laying his hand upon the hypogastric region.

ON THE TREATMENT OF RETENTION OF URINE.

WHEN I noticed the treatment of cystitis, so much was then said upon the treatment of retention of urine resulting from spasm and inflammation, that very little remains to be added on that subject; for, whether the spasm and inflammation affect the sphincter vesicæ or some part of the urethra, precisely the same treatment will be required. Under all circumstances of retention of urine, caused by inflammation and spasm, we may very confidently recommend warm bathing, mild but active cathartics, anodynes, and perhaps bleeding. Having already given a caution against the use of the lancet, and having just now said it may sometimes be proper, I think it right to state here, that there are some cases in which the loss of blood is more to be depended upon than

any other remedy, and in such it often must be very freely employed.

To shew still further that I have no wish to abridge judicious venesection, I may refer to the last case, where it will be seen that I took away forty ounces of blood in the first instance ; and I know full well that there are cases of retention of urine, where the patient is in the prime of life, where the pulse is exceedingly full, hard, strong, and rapid, where there is great determination of blood to the head, and violent fever, in which the relief of the patient ought to constitute the only criterion by which to limit the bleeding.

Warm fomentations and warm bathing are very generally recommended to be used in retention of urine ; experience certainly warrants great confidence being placed in them, but, from having been told by several patients who had complaints in the urethra, that they found much greater relief from bathing with cold water than from using water that was warm, I am disposed to think there may be some

cases of retention of urine which would be most relieved by the use of cold water to the perinæum ; and, I am strengthened in this opinion from finding it mentioned in Dr. Thomas Marryat's *Therapeutics*, " that the last resource is immersion of the feet in cold water." Possibly the manner in which it is here brought forward may constitute a good rule for its employment. I do not, however, perceive any objections that can be urged against its being used at any time when there is a full, strong, rapid pulse, and much increase of the temperature of the whole body ; for, as cold affusion during the hot stage of fever is found to allay general irritation and promote perspiration, so I think it would be likely to have beneficial local effects, if resorted to under the circumstances which are above described.

CASE.

This is an example of irritation and inflammation of the membranous part of the urethra, being so much aggravated by the

introduction of a bougie as to produce distressing retention of urine.

A gentleman of excellent constitution, and about twenty-five years of age, consulted me under an idea of his having a stricture. After I had passed a bougie, and inquired into the symptoms, so as to make myself master of his case, I assured him there was no stricture, and endeavoured to dissuade him from mechanical treatment; telling him that his excessive indulgence in venery, his improper mode of living, and the frequent occurrence of gonorrhœa, had brought on great irritation and inflammation throughout the whole length of the membranous part of the urethra. He returned to me again at the end of three weeks, and said he was quite sure he had a stricture, for that he had seen another gentleman who had recommended him to take large doses of the cubebæ, and as his symptoms got worse under the use of that medicine, he had attempted to pass a bougie into his bladder, which made him bleed a good deal, but would not enter beyond six inches, and this

gentleman then confidently affirmed that there was a stricture. I explained to him that the cubebs having increased the previously-existing inflammation, any attempt to use a bougie might bring on retention of urine : but he could not be satisfied without having one used. I passed a middle-sized bougie into the bladder, without its making any hesitation : in truth, it was introduced with more ease than it was withdrawn, for the whole membranous part of the canal was affected with such violent spasm, as perfectly to flatten all that portion of the bougie which had gone past the bulb of the urethra. It was evening when he came to me, and I recommended him to bathe with warm water before going to bed. The next morning he sent me a note, requesting to see me, for that he had been distressed all night with retention of urine. I found him in a violent fever ; his countenance was flushed, even his eyes looked red ; the pulse was full and strong, and the desire to urinate was most urgent. Twelve ounces of blood were taken from the arm eight ; leeches were applied to the perinæum ; he took an

ounce of oleum ricini: a quart of warm water was injected *per anum*, and when it came away, an anodyne enema, containing tinctura opii, was administered. He applied fomentations, and went into the warm bath as soon as it could be made ready. I saw him a second time in six hours, when he was much better, having emptied his bladder very shortly after coming out of the bath. He still, however, had strangury. He was then advised to continue the fomentations, and go into the bath about once in twelve hours; to drink plentifully of barley-water; to feed on nothing but rice milk, and to have a saline effervescing draught, with a small dose of tinct: opii et vin: ant: tart: every four hours. Under this treatment the retention did not recur, and the strangury went off in two days.

This case seems to shew the good effects of the treatment which was adopted, and, in my opinion, forcibly points out the impropriety of having recourse to the indiscriminate use of the catheter in all instances of the urine being retained. The

catheter, it is true, was not used upon this patient, but we see how much irritation resulted from the bougie, and we cannot suppose that the catheter would have been productive of less. The probability is, that the catheter would not have passed, or, if it had, that there would have been a second, and much more obstinate, retention.

Retention of urine, resulting from inflammation and spasm, may almost always be relieved by means of the warm-bath, anodyne enemata, mild but active purgatives, and the abstraction of blood. The celebrated Mr. Pott was so confident of this, that he writes ; “ There may have been cases which have resisted and baffled this method of treatment, but I have never met with them. On the other hand, I have seen so great and permanent mischief from the premature use of the catheter, that it would have been better for the patient to have sunk under the first evil, than to have lived to experience that variety of misery, to which all they are subject who are afflicted with a diseased or injured neck of the bladder.”

Heister, also, condemns the forcible introduction of the catheter in some cases of retention of urine—"from a violent inflammation of the neck and sphincter muscle of this receptacle, whereby the natural passage of the urine is sometimes so closely contracted, that the catheter can by no means be passed through it into the bladder, and *if forcible endeavours be used for that purpose*, it frequently not only increases the inflammation and pain, but sometimes also contuses the urethra, so as to bring on an incipient mortification, and death itself."

ON THE TREATMENT OF RETENTION OF
URINE BY TINCTURA FERRI MURIATI.

THIS medicine is very much recommended for the relief of retention resulting from the spasm of a stricture. It is said to relax the spasm by a mode of operation not easily explained. On this I cannot but remark, that it appears to me either there must be some peculiarity in the cases to which this remedy is suited, which is not generally understood, or else the merits of this medicine are greatly over-rated. I am much inclined to believe the latter, because the idea of giving tinctura ferri muriati for retention of urine, scarcely ever rises in the mind, without being associated with the name of that justly-eminent practitioner, Mr. Cline. It is very possible for the editor of the *Pharmacopœia Chirurgica* to have unintentionally

exaggerated Mr. Cline's recommendation of this medicine; and if this have been done, it will explain how the *tinctura ferri muriati* has come to be so highly appreciated.

I have inquired of several of my most intimate medical friends what has been their experience as to the effects of the *tinctura ferri muriati* in cases of retention of urine; and they have invariably, with the exception of one gentleman, a physician, told me they had never known it of the least service. My friend, the physician just mentioned, informed me that he had many times known it afford relief, by causing the urine to flow; but it is remarkable that, soon after this conversation, I had to attend a case of retention of urine along with him, and, at his particular desire, *tinct: ferri muriati* was taken by the patient, and it was in this instance attended with the most unpleasant effects. It excited the pulse, produced extreme thirst, general irritation, and a hot dry skin; in a word, it occasioned violent fever. This was the state of the patient the morning

after we first saw him. The medicine was changed for *magnes : vitriolata c infuso rosæ*, and about nine hours after taking the latter, the man became much more comfortable, and voided his urine. My friend was, however, so prejudiced in favour of the *tinctura ferri muriati*, that he could not be convinced of its being the cause of those effects which have been mentioned : he therefore prescribed the *tinctura ferri muriati* a second time, and it again produced the same effects, and the retention of urine returned. The patient was once more relieved by the saline mixture ; and then my friend tried the *tinctura ferri muriati* a third time, and with precisely the same result ; after which the saline medicine was continued, till the man considered himself to be cured.

It will be observed, that the effects of the *tinctura ferri muriati*, in the above case, were exactly such as occur after the improper use of any tonic medicine, but more particularly *chalybeates*. I will venture to assert, there is scarcely an individual of close observation, who has

been in the habit of taking wine, but will be able to recollect that the same wine has sometimes made him feverish, by constringing the pores of the skin and thereby suppressing the perspiration and causing general irritation, and at other times, the same wine has had precisely the opposite effects; relieving irritation, relaxing the pores of the skin, promoting perspiration and a genial glow all over the system. These different effects, from the same wine, can only result from its being taken when the stomach has been in different states. I have known equally different effects result from the taking of decoctum cinchonæ, or infusum gentianæ com: and upon the same principle we may reasonably explain how tinctura ferri muriati may relieve some cases of retention of urine from spasm of a stricture, and how the same remedy may aggravate other cases. Thus, if the spasm of the stricture be produced by irritation of the stomach, or of the whole system, and that irritation be such as the tinctura ferri muriati will remove; then the spasm of the stricture will relax, and the urine will flow, and *vice versâ*. It

cannot always be anticipated how the *tinctura ferri muriati* will operate, therefore, the effects of the first or second dose should be carefully watched. If it seem to excite irritation, it certainly ought then to be suspended; but if it evidently lessen existing irritation, then the medicine may be continued. The patient, with whom I have related that the *tinctura ferri muriati* particularly disagreed, was young, and in the full vigour of life, and of good constitution; therefore, if his case will justify any general conclusion, we certainly should suppose the tincture would better suit persons of weak and irritable constitutions, such as frequently are those of strictured patients in the decline of life, when perhaps the stomach may need some strong or peculiar stimulus.

ON THE TREATMENT OF RETENTION OF
URINE BY NICOTIANA.

THE well-known effects of nicotiana, in relaxing spasm and facilitating the reduction of strangulated hernia, suggested the probable utility of it in retention of urine, and I think it promises to be a valuable auxiliary.

In the sixth volume of the *Medico-Chirurgical Transactions*, there is a paper by Mr. Earl, wherein he relates three cases of retention that were successfully treated by infusum nicotianæ injected *per anum*, in all of which the tinctura ferri muriati had been previously employed without any advantage. One of these patients was relieved in three separate attacks by the nicotiana; it may therefore be said to have succeeded in five instances. The manner

of using this remedy, and the effects of it, will be illustrated by the following

CASE.

“ I was sent for to attend a young man labouring under retention of urine ; I found that he had been for years subject to strictures, but had always been able to void his urine until that morning, when, on rising, he was unable to discharge the contents of his bladder. He had been in the habit of passing a small whalebone bougie, which he now attempted in vain to introduce. He called on a neighbouring apothecary, who immediately attempted to pass a catheter, and used great force, which was followed by a copious flow of blood, but no urine. He was next bled from the arm, and some opening medicine was administered, and, as he was still unable to make water, I was called in.

“ I saw him about three o'clock in the day, the retention having existed from the

preceding night. He was still bleeding freely from the urethra, and had a most urgent desire to make water. I directed him to take the tinctura ferri muriati, and to sit in a tub of warm water. He took eighteen doses of the tincture without any perceptible effect but nausea. I now attempted to pass a bougie, but, when about eight inches down, it quitted the right track, and was readily detected, by introducing the finger *per anum*, passing between the bladder and rectum. I immediately withdrew the bougie, which had caused much pain, though introduced with the utmost care and gentleness, and ordered an infusion of nicotiana, of the strength of one drachm to eight ounces, to be used as an enema. I was under the necessity of leaving him, to visit a patient a short distance from town, but, on my return, in less than two hours, I was informed that a short time after the injection he had been very faint, and had perspired copiously, during which time the urine flowed from him in a stream."

The smoke of nicotiana produces the

same effect as the infusion, but I think the latter preferable, because I have known an instance where the smoke took no effect till a large quantity had been used, and then the most distressing symptoms came on suddenly, and continued two hours without intermission: perhaps, however, this may have been only an accidental occurrence, but it certainly deserves to be borne in mind, and points out the propriety of taking care not to administer the fumes too hastily. The safest plan always will be to wait for some time after throwing up a moderate quantity, to ascertain the necessity for more before injecting it.

ON THE TREATMENT OF RETENTION OF URINE BY INSTRUMENTS.

ALTHOUGH the judicious use of those means which have been enumerated will seldom fail to relieve retention of urine when it arises from spasm or inflammation, yet it must be confessed that some cases render the introduction of instruments absolutely necessary. It appears to me occasionally that when spasm or inflammation have forcibly closed the urethra, nothing less than mechanical dilatation by instruments will again make way for the urine to flow. I say instruments, because we may conceive that the urine must act mechanically, and that it would operate as the most effectual of all mechanical means, for retained urine, like any other compressed fluid, must push equally in all directions to find a way to escape; hence we may suppose that no point about the neck

of the bladder or of the stricture which the urine reached would be left untried : we may suppose that it would insinuate itself where no solid body could be made to enter, independently of the latter being ill directed : we may also suppose, that if a little urine entered, it would cause a further dilatation, and that every possible advantage would be taken of this circumstance by the quantity of the urine increasing : and lastly, we may suppose that if the passage pursued a tortuous course this would prove no impediment to the urine, although it might be an effectual bar against the introduction of instruments. But, if we examine this subject in a different point of view, we shall then clearly perceive how much advantage may be derived from instruments in some cases, and the absolute necessity that exists for their employment in others.

The opening of the sphincter vesicæ during health appears to be owing to a combination of three circumstances. The urine may be said to constitute a ball, round which the detrusor urinæ muscle

contracting, may be supposed to draw open the sphincter; secondly, a column of urine being pushed through the partially dilated sphincter, will certainly tend to expand it more fully; and thirdly, there is a degree of relaxation takes place in the sphincter itself, which of course promotes the operation of the other two causes. But, when the urine has been retained beyond a certain period, it often happens that not one of the above causes exists to promote the flow of the urine: thus, so far from the sphincter relaxing, it is affected with spasm; and, until some degree of opening have taken place in the sphincter, the push of urine cannot act to expand it more; and lastly, it is with the detrusor urinæ muscle as with all others—that after being kept in action a certain time, it either acts with diminished power, or does not act at all. Fomentations, warm bathing, cathartics, opiates and bleeding, are often successful in allaying irritation the cause of spasm in the sphincter; but there is one kind of irritation which results from the retained urine, which can only be allayed by its evacuation; hence

so far as that operates to irritate the sphincter, the remedies just mentioned can have little or no effect in removing the spasm ; and, when once the detrusor urinæ muscle has become fatigued, it can only regain its power by being allowed to contract, which it cannot do so long as the urine distends it. Now, if the spasm of the sphincter be kept up by the irritation of the urine, the introduction of an instrument to open the sphincter becomes necessary, otherwise the urine cannot be brought away ; but, when this has been once effected, then warm bathing, anodynes and aperients, often prove sufficient to prevent future spasm and retention.

The effect of the retained urine may be illustrated by what often occurs in hemorrhoids ; the sphincter ani being irritable gripes a pile ; the pain in the pile irritates the sphincter more and causes it to contract still more forcibly, and that increases the pain in the pile ; thus they are mutually rendered both cause and effect, and, so long as things are allowed

to be in this state no remedies will procure relief; but if the pile be once carefully returned by means of the finger, so as to rest within and above the sphincter, then we find no difficulty in allaying the only remaining irritation in the sphincter ani. Whenever, therefore, we have reason to believe the spasm of the sphincter vesicæ is kept up only by the irritation of the urine; if that irritation have existed but a short time, an instrument used delicately may often be introduced with facility, and consequently without injury to the patient. Under these circumstances we cannot have recourse to instruments too soon after seeing the patient, because the sooner the urine is got away the less irritation it will have excited; there will then be less spasm of the sphincter than when more time is allowed to elapse: there will be less urine in the bladder, and the detrusor urinæ muscle will have suffered less from over distention. Such are the reasons which I would assign for recommending the introduction of a catheter with the least possible delay in all cases of retention of urine which have been brought on in per-

fectly healthy parts, by the individual's having been obliged to retain his urine by voluntary efforts, long after the desire to evacuate it has been excited ; for, in these instances the spasm of the sphincter vesicæ having been first occasioned by powerful volition, is afterwards continued in consequence of irritation from urine.

Three other reasons offer themselves in favour of instruments for the relief of retention of urine. There are some cases resulting from disease having formed a kind of valve over the internal orifice of the urethra which confines the urine more and more perfectly in proportion to the violence of the efforts to expel it : these cases can only be relieved by the use of instruments, but they will be more fully spoken of in the sequel. Secondly, a bougie armed with argentum nitratum applied to a stricture in a state of spasm has been known to take off the spasm, an instance of which is recorded by Sir Everard Home. And, thirdly, retention of urine from mere spasm is sometimes relieved by the introduction of a bougie only a little way along the

urethra. I have read of a case in which the urine flowed immediately after a bougie had been passed only two inches down the urethra ; and three instances are related by Mr. Whately, of the urine coming away soon after a bougie had been introduced, although in two of them the instrument did not enter the bladder. One of these it may be well to adduce.

CASE.

“ I was called to relieve a gentleman under great pain, from a total suppression of urine, occasioned by strictures in the urethra. The proximate cause of the attack was fever. He formerly had many partial suppressions from cold : but they were totally different from that with which he was now affected. He had a very narrow stricture at six inches, and another at seven inches distance from the orifice. With difficulty I passed a very fine bougie into them ; but it became a little twisted, and would not go into the bladder. After keeping it in the urethra about three

minutes, and withdrawing it, the urine followed in a very thin stream, by which about a quart of urine was drawn off. The bougie was afterwards introduced several times with the same good effect, before the bladder had power to expel the urine."

Bougies may also be serviceable to prepare the way for the introduction of the catheter, as will be seen by the following case given by the late Mr. Hay, of Leeds :

CASE.

" I was called one morning to assist a young man, who had been in great pain all the preceding night, from a retention of urine, and who had been drinking freely of gin, to enable him to make water. I immediately made use of an elastic gum catheter, covered with fresh lard, which entered the urethra without difficulty. It had scarcely passed half the length of the penis, when the resistance became so great, from the adhesion of the urethra to the instrument, that I thought proper to with-

draw it. That part of the catheter which had been in the urethra appeared dry as if it had been wiped with a cloth. I then introduced a small bougie, well anointed, which dilated and moistened the urethra, and thereby enabled me to introduce the same catheter with ease &c."

* I think it likely that cases similar to the above might be effectually relieved by injecting warm oil into the urethra. This is said to be practised in Italy, and to succeed when the retention results from spasm of a stricture. Warm oil thrown into the bladder having in one instance mitigated violent spasms of that viscus, would lead us to expect it might have a similar effect upon the urethra. Those cases of retention which I have mentioned as having been relieved by only the *partial* introduction of a bougie, shew that if mechanical dilatation was the successful means, very little was necessary, and how can this be so delicately effected as by the injection of warm oil? But, if it was not the mechanical dilatation of the urethra which removed the spasm in these cases, then we must ascribe the success to nothing else but the effect of the oil or lard that was conveyed upon the bougies into the canal. We may readily believe that the irritation of an inflamed, contracted, dry urethra, would be materially lessened by the application of warm oil; or should this answer no other good purpose, it would probably facilitate the passing of an instrument subsequently, therefore at all events it is worth a trial.

ON CATHETERS, AND THE MODE OF
USING THEM, WHEN RETENTION
OF URINE IS CAUSED BY SPASM
OR INFLAMMATION.

ELASTIC gum catheters are preferable to those made of silver, as the latter only possess one advantage over the former, that of durability, while the flexible gum catheters have several valuable qualities peculiar to themselves. Used on a stilet they may have the same degree of firmness imparted to them as belongs to the silver ones, and owing to their pliability, if employed without a stilet, they may frequently be successfully introduced in the same manner as a bougie, which is by far the simplest operation of the two, and often constitutes the only means by which an unpractised operator will be able to succeed.

A catheter should be perfectly cylindrical, and have the smoothest possible surface. Its point should be round, and the side opening, or eye, as it has been termed, cannot

be too small, for the purpose of facilitating its introduction ; it must, however, always be large enough to admit the fluid which is to come away : but when there is much mucous secretion in the bladder, the canal of the urethra is generally so free for the passage of the catheter, as to make the size of the side opening of very little importance as respects the introduction of the instrument.

If the catheter is to be used on a stilet, the proper degree of curvature for the latter is a material circumstance ; but this must vary to suit the peculiarities of particular cases. When the natural course of the urethra has not been altered by disease, a good operator will be able to introduce with nearly equal certainty, although, perhaps, not with an equal degree of facility, catheters having various degrees of curvatures. But every surgeon will do right to confine himself as much as possible to one kind of curvature ; for he will thus acquire more confidence and facility in using the instrument, than ever can be done by employing a variety of catheters

having different curves. The truth of this remark is verified by eminent practitioners, differing in opinion as to the best shape for catheters ; because, if, instead of being guided by their own experience, the result of which may depend very greatly upon their manner of using the instrument, they were to decide wholly upon the principle of accommodating the instrument to the canal, then, correct reasoning must bring them all to the same conclusion : for it is indisputable that some one shape must be the best suited to the generality of cases ; and every young surgeon ought to begin by learning to introduce a catheter of that precise curvature. The one which I have found to pass with the greatest facility through a natural urethra, exactly corresponds with that represented by the plate ; and, upon comparing it with that recommended by the late Mr. Ware, they are so nearly alike, that I should have little hesitation in quoting his authority in behalf of my own instrument.

Next to the shape of the catheter, the size of it deserves consideration : this, of

course, will vary in proportion to the dimensions of the urethra ; but it may be laid down as a maxim, that the larger the instrument is, provided the urethra will receive it, the more certainly will it be introduced.

It is much to be regretted, that the operation of passing the catheter is so generally considered an easy one : few surgeons take sufficient pains to make themselves thoroughly masters of it, and still fewer ever attain to it so perfectly as might be done. It is one of the most delicate operations in surgery, and the success of no one depends more frequently upon the dexterity of the surgeon and the goodness of the instrument. The proper mode of introducing a catheter is, to hold the concave side towards the patient's abdomen, while it is carefully insinuated down the urethra, till its point has passed below the arch of the pubes, at which moment the operator, using no force, should gently carry his hand towards the patient's knees, and that movement alone will direct the point of the instrument properly till it en-

ters the bladder. The catheter will pass the more easily if it be held lightly ; for, however well the practitioner may be acquainted with the anatomy of the canal, the adroit performance of this operation depends upon such delicacy of feeling, and nice management, in accommodating the hand to the inclination of the instrument, that this may almost be said to guide the surgeon's hand, instead of being itself guided by him.

The practice of first introducing the catheter with its convexity towards the patient's body is objectionable, because when its point has got past the arch of the pubes, it must be turned half round to reverse the position of it, and in effecting this turn, if the point be not made the centre of motion, there will be great danger of injuring the urethra. If, however, this method be preferred by the operator, the instrument must be allowed to be loose upon his hand in taking this semicircular sweep, and he must delicately accommodate his hand to its movements, as it inclines to approach to or recede from

the body while he gently carries it round, and then the urethra surrounding it will determine the centre of motion to the point : but if the surgeon exert the slightest degree of control beyond what has been mentioned, the point of the instrument will never constitute the centre of motion, and he will incur risk of doing mischief, great in proportion to his unnecessary interference.

If the canal is free to admit the catheter, and any difficulty occurs, it most usually happens in the bulb of the urethra, and is occasioned by the point of the instrument being pressed too much towards the rectum : when this is discovered, the catheter should be withdrawn a little way, and then be carried forward again, having its point so directed, as if trying to make it rub against the posterior surface of the pubes. This expedient generally succeeds, and the necessity of it has been ably pointed out by the late Mr. Wilson, in a paper accompanied with an engraving in the first volume of the *Medico-Chirurgical Transactions*. If, after well-conducted attempts, it be ascertained that

the urèthra is closed against the catheter, it will be desirable to determine whether the obstruction results from spasm or inflammation. Should it be the latter, then venesection, or local bleeding, and warm bathing, ought to be employed, before again having recourse to the catheter. But if it be spasm, then an opiate had better be given, and warm bathing be recommended, prior to using the instrument. The reason for taking away blood before giving an opiate, under circumstances of inflammation, is, that the same quantity of blood taken away while the patient is under the influence of opium, does not produce so much effect as it would have done previous to the anodyne being taken; and if it should happen that both an opiate and the loss of blood become necessary, the anodyne will have most effect after the bleeding. The abstraction of blood, however, is not always to be had recourse to, even when inflammation is known to obstruct the introduction of the catheter; for, if the inflammation be of the irritative kind, then possibly the patient may not be in a fit state to support the loss of blood; but

whether he be or not, the inflammation will be most effectually allayed by an opiate. But if the patient be strong, the inflammation violent, and there be a full, strong, and hard pulse, although there may be some degree of irritation which will render an anodyne useful, yet bleeding and warm bathing ought to have the most of our confidence.

CASE.

A MAN, about forty years of age, called me up at one o'clock in the morning, to relieve him of retention of urine. I had never seen this patient before ; but he told me he was subject to have similar attacks come on suddenly, without being able to assign any cause that could produce them ; but after having had his urine drawn away once or twice he often remained well for months.

The retention, in the present instance, had lasted about eight hours ; and, by the advice of some of his acquaintance, he had

been drinking common gin to enable him to make water, but without any good effect, and he found his pain growing more violent every moment. Here was a case in which it was evidently an object to get the urine away as quickly as possible, as there could be no doubt that the irritation of the retained urine was operating very much to increase the spasm which prevented its evacuation. I tried the catheter, but no manœuvring could make it enter the membranous part of the urethra. He then took *tincturæ opii*, gtt. xx.; and I could have wished him to bathe in warm water, but none could be had at that hour of the night without considerable loss of time. After waiting by him about a quarter of an hour, the catheter passed readily, and drew off about a pint of urine. He was then ordered *hydrarg: submur: gr. iv.*, and a cathartic mixture—and was told to bathe the perinæum with warm water. About ten o'clock the next day he came to have his bladder emptied a second time, and since that I have heard no more of him.

ON RETENTION OF URINE, FROM DISEASE
OF THE PROSTATE GLAND.

THIS is a very common occurrence, and I think it produces retention of urine more frequently than any other single cause. We may always suspect this to be the case, if the patient be known previously to have had symptoms of disease in the prostate ; or if, upon attempting to introduce an instrument it enters with facility, as far as seven and a half, eight, eight and a half, or nine inches, and then it meets with an obstinate impediment to its further progress.

If we examine the canal with a bougie, (which is often very proper, before using a catheter,) the bougie, when it arrives at the prostatic part of the urethra, often communicates a sensation to the hand,

by which the operator may give a pretty shrewd guess as to the state of the prostate; but in many cases this can only be satisfactorily determined by means of the finger in the rectum. Nothing so frequently operates to alter the course of the urethra as a morbid enlargement of the prostate gland, and it affects it in several ways. This gland is constituted of three lobes, two of which are situated laterally, one upon each side of the canal, and the third is placed posteriorly between the urethra and the rectum, and forms a connecting medium for the lateral lobes. Whether the whole substance of the gland be enlarged, or the middle lobe only, it proportionably increases the natural curvature of the urethra upwards; but if the enlargement be confined to one of the lateral lobes, it then obliges the urethra to pursue a winding course towards the opposite side. The posterior, or middle lobe of the prostate, is the part which is by far most frequently the subject of disease, and consequently the change which oftenest affects the urethra, is that of its natural curvature being considerably increased.

Morbid enlargement of the prostate operates in two ways to bring on retention of urine. Sometimes the canal of the urethra is entirely closed by the two lateral lobes swelling and pressing firmly against each other ; but it more generally happens that the urine is obstructed by the middle lobe having enlarged, projected into the bladder, and turned forward, so as to form a complete valve over the internal orifice of the urethra. In one instance I have known the obstruction to be occasioned by an excrescence which grew all round the internal orifice, and which had the urethra passing through its centre: thus there was a somewhat similar and quite as complete a valve formed as that at the termination of the intestinum ilium in the caput coli. When an instrument will pass to and fro freely for the distance of eight, or eight and a half, or nine inches along the urethra, the retention of urine will then generally be owing to the valvular projection of the middle lobe of the prostate over the internal orifice of the canal ; but if when the instrument has entered about

seven inches and a half, it be impossible or difficult to urge it further, and when it has passed further, it be found equally difficult to withdraw, and if it be a bougie that has been used, and its point appear flattened at the sides, then there will be reason to conclude that the lateral lobes of the gland press firmly against each other, and so obstruct the flow of urine. This latter kind of obstruction usually comes on in consequence of inflammation of the prostate, and is indicated also by a great sense of weight, heat, and fulness, and perhaps aching pain in the perinæum, and about the pubes. Very often both these kinds of obstruction exist at the same time, for as that which results from the pressure of the lateral lobes against each other, may be brought on at any time by a sufficient degree of inflammation, so it is apt to take place when the valvular projection of the middle lobe exists already. Inflammation may, indeed, be the cause of the valvular obstruction, for although the middle lobe of the prostate be morbidly enlarged, it may

not be sufficiently so to obstruct the flow of the urine ; but if it become inflamed, then the increase in size that necessarily follows, makes it shut up the urethra completely.

ON THE TREATMENT OF RETENTION OF
URINE FROM ENLARGEMENT OF THE
PROSTATE GLAND.

THIS consists in the use of precisely the same means which have been recommended for the relief of retention produced by inflammation or spasm of the urethra ; with this difference, however, that in retention from enlargement of the prostate, the catheter is much more needful, and the other means are seldom required for any other purpose than to facilitate the introduction of the catheter. If the retention be occasioned by the valvular projection of the posterior lobe of the prostate, nothing but the passing of an instrument can bring away the urine ; therefore when that is known to be the real state of the case, it is useless to waste time by having recourse to opiates, bleeding,

cathartics, and warm bathing, for these cannot get the urine away, and the longer the urine is retained (within a given period) the more will there be secreted, the more it will try to escape, and the more certainly will it be prevented; because the pressure of the urine towards the urethra pushes the valvular projection of the prostate against the internal orifice, and shuts it up the more completely. Under these circumstances, nothing can relieve the patient but the introduction of some instrument that will put back the valvular projection of the prostate and draw off the urine. If a catheter can be passed between the lateral lobes of the prostate, as far as the valvular projection of it, then the surgeon ought not to rest satisfied till it be made to enter the bladder, for that alone is the proper remedy for such a case. But if the swelling of the two lateral lobes obstruct the passage of the instrument through them, then bathing the parts about the pelvis in warm water, applying leeches to the perinæum, venesection, cathartics and anodynes according to circumstances,

will be necessary to reduce the inflammation of the lateral lobes, and facilitate the passing of a catheter between them.

Should it be known that the retention has been occasioned solely by the increased size of the valvular projection of the prostate in consequence of recent inflammation, we must not expect to empty the bladder by the use of means only calculated to subdue inflammation ; for the irritation of the urine at the neck of the bladder seems in a measure to counteract the effect of the common remedies against inflammation ; but when the urine has once been got away, then the usual antiphlogistic remedies are sometimes sufficient to prevent a second retention. If the retention of urine be entirely owing to the lateral lobes swelling and pressing closely against each other, then it is possible the patient might be relieved by those means which are best calculated to subdue the inflammation of the gland ; but I think it is a good plan in those cases, to employ a catheter as soon as ever there is enough space to allow of its being passed without

violence, for we never can tell but that there may also be a valvular projection of the posterior lobe, and then nothing but the catheter should be trusted to. Besides, when the lateral lobes are so swelled, so hard, and so firmly pressed together, as totally to obstruct not only the flow of urine, but also the introduction of instruments, it sometimes happens that warm bathing, bleeding, &c., will reduce the hardness and swelling so as to allow of a catheter being passed easily long before the urine would have come away without it; and in that case the sufferings of the patient will be proportionately shortened, and an additional source of irritation will be removed, which, if allowed to remain, would tend to keep up the inflammation in the gland. So that in all cases of retention of urine from disease of the prostate, warm bathing, blood-letting, cathartics and anodynes, are to be considered useful, chiefly for the purpose of procuring a passage for the catheter. The directions which might have been given in this place, for the management of these auxiliaries, are so similar to those already mentioned when speaking of

the treatment of retention from inflammation and spasm of the urethra, that it would be an unnecessary repetition to say more than that they are equally applicable to the the treatment of inflammation of the prostate. I shall, therefore, proceed to point out those peculiarities which demand attention to ensure the successful use of the catheter, when the disease of the prostate has altered the course of the urethra ; for therein consists all that is peculiar in the treatment of retention of urine, resulting from affections of the prostate gland.

ON THE USE OF THE INFLEXIBLE CATHE-
TER, WHEN THE URINE IS RETAINED
BY ENLARGEMENT OF THE
PROSTATE.

GENERALLY speaking, the increased curvature which the urethra receives from enlargement of the prostate, requires the catheter to be more bent than what has been recommended for other cases ; but as this renders the introduction of the instrument through the membranous part of the canal rather more difficult, it is satisfactory to know that, with proper attention to elevate the point of the catheter as much as possible, by the surgeons depressing his hand much more than is necessary in other cases, he may often succeed very well with an instrument that has no more curvature than is required for a natural urethra* :

* We may conclude that Sabatier never bent his catheter more than ordinarily, for, in describing the proper kind of instrument to pass through a diseased prostate, he merely

CASE.

An old gentleman, between sixty and seventy years of age, frequently required my assistance to relieve him of his urine, which was retained by the swelling of the prostate. I always succeeded with a catheter of that degree of curvature which has been already recommended for cases of mere spasm of the urethra ; sometimes, however, it could not be made to enter between the lateral lobes till about a quar-

observes, “ Il faut, dans ce cas employer une sonde dont le bec soit extrêmement allongé.” (*De la Médecine Opératoire*, p. 75.)

Desault recommends, in cases of retention caused by enlargement of the prostate, for the point of the catheter to be both longer and more curved ; but he seems to think a catheter of the usual shape may always be made to succeed equally well by careful management ; for, continuing to speak of the point, he adds, “ ou être tenu plus élevé pendant l'introduction que dans les autres embarras du canal.” (*Œuvres Chirurgicales de Desault par Bichat*, tom. iii. p. 224.

I shall, however, take occasion to shew, that in retention of urine from diseased prostate, it is sometimes impossible to get away the urine by means of the catheter, unless it be considerably more curved than what is required for other cases.

ter of an hour after he had taken tinctura opii gtt. xx, but then it always went on readily. He died from disease in his kidneys, and permission was given me to examine the body.

The prostate gland was nearly of the size of my fist, and the whole of this increase of bulk appeared to arise from enlargement of the two lateral lobes, for the middle lobe was not swelled in the slightest degree. The surface of the urethra appeared healthy throughout its whole length, but the prostatic part of the canal was so much enlarged, that it admitted my thumb with facility. This widening, however, was only anteriorly and posteriorly, for, in truth, the canal was narrower than usual from side to side, owing to the morbid growth and mutual pressure of the two lateral lobes. This wide part of the urethra seemed to terminate abruptly against the bladder, and the internal orifice was situated at the anterior or upper corner of this abrupt termination, so that an instrument moving along the posterior or lower surface of the canal, could not have entered the

bladder without puncturing it. And to convey an idea how much it was necessary for me to depress the handle of the catheter, I may state, that as the patient stood before me voiding his urine through the instrument, it pointed downwards almost perpendicularly. There can be no doubt of the retention of urine in this case having been occasioned by the two lateral lobes pressing against each other, because, except when they were more than usually enlarged by irritation and inflammation, he always made water well enough by the natural efforts.

It would be superfluous, otherwise three more cases might be cited to prove that where the prostate is considerably enlarged, the course of the urethra through it differs greatly from what can be said to be natural ; but if the surgeon only knows how to accommodate himself to those circumstances, he may often be able to introduce a catheter having that degree of curvature which is intended to suit a urethra in a perfectly natural state. One advantage of this proficiency has been noticed, and a

second is, that we sometimes cannot know that the course of the urethra is altered till after we have passed an instrument as far as it will go along the canal ; and, supposing that we have thus employed a catheter, possessing only the common degree of curvature, if by means of a little more dexterity we can then get it into the bladder, it will be far preferable to having recourse to another. When a discovery of the above kind has been made, the instrument should be immediately drawn back about an inch and a half ; this done, the surgeon should lower his hand as much as can be done without injuring the urethra with the point of the instrument, and then by urging it forward again, he will often succeed in getting it into the bladder.

As a catheter that is shaped to suit a healthy urethra will not always pass when the course of the canal has been altered by disease, so it must be obvious that no one shape will suit all cases where the course of the urethra has been affected by the morbid state of the prostate. But,

whatever may be the shape of the instrument, it will always be right to endeavour to use it agreeably to the directions which have been laid down ; and, when they fail, the surgeon must manœuvre according to the circumstances of the case. In proportion as the curvature of the catheter is increased, there is, as before observed, greater difficulty in passing it to the prostatic part of the canal ; and once I have been obliged to use a catheter so much bent, that when it had to move along the membranous part of the urethra, I found the best mode of urging it forward was by pressing one hand against the perinæum, whilst with the other I gently put more of the instrument down the canal ; but, when it arrived in the prostatic part, it glided into the bladder easily. This happened in a case where catheters of different degrees of curvature had previously been tried in vain. The difficulty in using, the successful instrument arose from the necessity of bending the first two inches of the catheter so much, that it was impossible to keep the point moving in the axis of the membranous part of the canal ; I

therefore, could not introduce it along that part by the usual simple action of inclining my hand towards the patient's knees, for fear of pushing the point through the upper surface of the urethra. I have been induced to mention this, thinking it likely that the same difficulty may occur to others, because, as disease in the prostate can affect only that part of the urethra which runs through it, consequently to accommodate the catheter to such an alteration in the canal, it only becomes necessary to impart an additional degree of curvature to the point of the instrument, all the remainder had better have precisely the same shape as that recommended to suit a natural urethra. Cases may occur wherein catheters quite as much bent at the point as that which I employed may be passed through the membranous part of the canal, without any necessity for pressure being made against the perinæum, because the dimension of the urethra varies in different patients ; but, it is evident, that in proportion as the instrument is more curved in order to conduct the point along the membranous part of

the canal, we must not in passing it make the handle approach the thighs of the patient so much as in the common method of introducing it. Under such circumstances if pressure be not applied to the perinæum, the hand of the operator ought to move as if he were desirous to hook the pubes on the catheter, as this will direct the point pretty much the same as would be done by pressing against the perinæum.

Another successful expedient is illustrated by the following

CASE.

A gentleman about 40 years of age had a retention of urine, occasioned by a valvular projection of the prostate. I endeavoured by every possible means to get his urine away, but neither bougie nor catheter could be made to enter the bladder. I tried every variety of catheter flexible and inflexible, large and small; they were employed of every variety of shape, and in every different manner that

I could devise, but all in vain. Whether the point of the instrument moved along the upper or lower surface of the canal, or to either side, it was equally obstructed. At last it seemed to me that the point hitched in the anterior surface of the urethra, and that unless it could be carried beyond that part before it was raised so high as to endanger its being entangled, there would be no success. I, therefore, passed the instrument along the inferior surface of the canal as far as it would go, then raised the point once more towards what I conceived to be the entrance to the bladder, but before I had raised it quite so high as had been done in the former attempts, I made a push directly backwards as if trying to bend the catheter still more, by making two inches of the point press firmly against the posterior surface of the urethra, and the result was that it immediately went into the bladder. My object in thus pushing backwards was, if possible, to put back the valvular projection of the prostate, by the pressure of the instrument, far enough to admit the point of the catheter beyond that part of

the upper surface of the urethra where it had previously always lodged. What was the precise nature of the obstruction on the upper surface of the canal I am now rather at a loss to determine, unless it was owing to the inflammation of the part that existed during my first attendance, because I have since passed instruments upon the same patient without meeting with any difficulty, or being obliged to use more than ordinary care.

It is frequently recommended to pass a finger into the rectum for the purpose of guiding the catheter, when any difficulty occurs in getting it into the bladder: this, however, I believe to be productive of no kind of advantage if the surgeon perfectly understand the use of the catheter and the instrument be inflexible, for we have as much command over the point by having hold of the other end as we can obtain by touching any other part. I think it right, however, to mention, that if the operator be not well versed in the introduction of the catheter, he may possibly find some advantage from his finger in the

rectum. Going one day early in my apprenticeship to dress my master's patients at the hospital, I found some of the pupils endeavouring to pass a catheter upon a boy about fourteen years of age, who had retention of urine in consequence of taking large and repeated doses of opium. When others had failed, I was asked to try what I could do. I succeeded no better than they had done till I put one finger into the rectum, and by that means elevating the point of the instrument, it went forward into the bladder. This could not, however, be any thing more than the effect of mere chance, because I believe it was the very first catheter that I had ever attempted to introduce, but it may serve to shew the advantage of a finger in the rectum, when we have any doubt of the instrument's being properly directed.

ON THE USE OF FLEXIBLE CATHETERS
TO RELIEVE RETENTION OF URINE
CAUSED BY ENLARGEMENT OF
THE PROSTATE GLAND.

DIRECTIONS having been given to facilitate the passing of inflexible instruments in cases of retention from swelling of the prostate, I shall now proceed to make some observations on the management of elastic gum catheters, and the peculiarly valuable properties which they possess. The great superiority which the flexible catheter has over all others, is, that by using it upon a strong stilet we may give to it any degree of curvature we please, and when it has been partly introduced, we have power to vary the curvature, if necessary, while it remains in the urethra. The alteration in the shape is accomplished by moving the stilet to and fro within the cannula. So long as the

stilet remains pushed quite home within the cannula both will of course retain the same degree of curvature that has been imparted to the stilet previous to its introduction; but when the stilet is a little withdrawn, it increases the curvature of the cannula, and at the same time produces a flexible point, both which effects are often extremely desirable; for, supposing it possible for the instrument to have been a little misguided, it will then, if the point be rendered flexible, have an opportunity of finding out the way for itself; and if any obstruction be met with on the under surface of the canal, the curvature of the cannula being increased the moment before it arrives at the impediment, it is enabled to glide over it, being thrown more closely against the opposite side of the urethra. The two qualities just described, make the flexible gum catheters preferable to all others in cases of retained urine in consequence of enlargement of the prostate gland, because it is in such diseases that the greatest degree of curvature is required. It has been noticed that the degree of curvature necessary to be

given to the point of inflexible instruments to enable them to mount over the valvular projection of the prostate sometimes renders it difficult to pass them along the membranous part of the canal ; the flexible gum catheters seldom encounter this difficulty because no increase of curvature is required before they have gone through the membranous part, and it can be given to them at the critical moment when it is wanted ; at which time, if necessary, a greater degree of curvature may be imparted to the flexible catheter, than what, if communicated to an inflexible one, would allow of its being introduced to that part where it would prove useful.

CASE.

I was requested to visit a middle-aged gentleman who had had more or less retention of urine during four days. The bladder was enormously distended, and bulged out the integuments of the abdomen close to the umbilicus ; but there was no apparent tumor in the hypogastric

region, and judging by the hand applied just above the pubes, I should hardly have imagined the bladder to be full of urine. By my finger in the rectum, I discovered the prostate gland to be exceedingly enlarged and tender, and could have no doubt of that being the cause of the urine's being retained. I tried to introduce every variety of instrument as to shape, size, and flexibility, but none would pass ; even a bougie could not be made to go quite through the prostate, but they all went so far as satisfied me they were obstructed by a valvular projection of the posterior lobe. The patient had a full, hard, strong pulse, and as there was every symptom of considerable inflammation of the gland, I took sixteen ounces of blood from a vein in the arm, which having produced faintness, the catheters were then tried again, but with no better success. Eight leeches were applied to the perinæum. He took hydrargyri submur : gr. vj. pulv : antim : gr. iij. et pulv : opii, gr. i., made into a pill, and followed by olei ricini, $\bar{3}$ ℥. every hour afterwards, and he was directed to keep fomentations of flannel

wrung out of hot water, or bladders of hot water constantly applied over the pubes and to the perinæum. I saw him again in four hours, immediately after he had used the hip-bath, and attempted the introduction of the catheter, but it would not enter the bladder. He was then desired to continue the fomentations, and the oleum ricini till it operated. The bowels discharged copiously in about six hours after his beginning to take the cathartics. He then went into the hip-bath again, and I again tried the catheter, but with no better success. An enema of two quarts of warm water was now thrown up, and when that returned, which it did in a few minutes bringing away a large quantity of fæces, an anodyne of tinct: opii gtt. xL, was injected. He was directed to keep in bed, continue the fomentations, and take a draught containing antim: tart: gr. $\frac{1}{4}$, every three or four hours. These medicines produced languor and profuse sweating. The injection of warm water was repeated in six hours, and immediately after it came back the tinct: opii gtt. xL, was used as before, and he went into the

hip-bath. I prepared a very large bougie by bending up the point a good deal, much more than in ordinary cases, which when he came out of the bath, passed into the bladder, but no urine followed on its being withdrawn. This, however, satisfied me that there was now room for the catheter. I accordingly introduced a large flexible gum catheter upon a strong stilet, but it would not go into the bladder: I increased the curvature of it by drawing back the stilet about two inches, but still it would not pass. The instrument was then removed from the urethra, and before introducing it again, I gave such a degree of curvature to the point of the stilet, as made it somewhat difficult for the instrument to pass through the membranous part. When the catheter had arrived where it had always before been obstructed, I once more withdrew the stilet to increase the curvature of the cannula still more, and at the same time urged the latter on towards the bladder: it entered, and drew off eight half pints of urine. On account of the difficulty experienced in passing the catheter, it was retained in. At the expiration of

the first three days, the catheter was taken out, and being cleansed, was introduced again, and allowed to remain four days longer ; during which time, (a week,) the bladder regained the power of emptying itself completely. The instrument was afterwards employed a few times to ascertain the state of the bladder, but the result always proved so satisfactory, as rendered my attendance very soon unnecessary.

The great superiority of the flexible gum catheter on a strong stilet, is clearly shewn by the foregoing case, which also evinces how much the introduction of instruments may sometimes be facilitated by means of venesection, cathartics, anodynes, and warm bathing.

Another instance may be mentioned to prove the advantage of using a flexible gum catheter upon a strong stilet ; but the principal value of the following case consists in its serving to shew that retention of urine may be mistaken for incontinence of it or strangury.

CASE.

I went to see an infirm old gentleman, aged 63. The family informed me that he had had incontinence of urine for two years or more, and that he was subject to have occasional fits of strangury. The reason of my being requested to attend this patient was, that his usual medical adviser was from home, and not expected to return for some days. The old gentleman had complained of strangury for six days previous to my seeing him, but did not pay much attention to it, as he usually voided a quart or more of urine every twenty-four hours. The preceding night he had been very restless, although there appeared to be a great disposition to sleep, and a degree of stupor about him. His skin was hot and dry; pulse 110, hard and full; and his tongue covered with a dark-brown fur. There was great tenderness and tumor in the hypogastric region, and his urine was high coloured, and let fall a dark-brown sediment; symptoms which convinced me

that a considerable quantity of water still remained in the bladder.

I met with much difficulty in the introduction of the catheter, owing to the irritable state of the urethra ; and when the instrument reached into the prostate, it would not pass till after the stilet had been withdrawn an inch, which elevated the point into the bladder. Five pints of high-coloured urine came away, but the bladder was so completely paralytic, that none could be discharged without external pressure. I desired him to abstain from wine entirely, of which he had usually drank half a pint daily. Fomentations were ordered to the perinæum, and hypogastric region, but I have reason to believe they were not used. *Sumat haust : salin : durante effervescencia quartis horis.*

Evening—Skin was moist ; pulse 90 in a minute ; his tongue was white and moist ; he had considerably less stupor than in the morning, and there was much less tenderness on pressure above the pubes.

Three half pints of pale urine came through the catheter.

The next morning, June 13.—The urethra was so extremely irritable, it would not allow the catheter to pass, till fomentations had been employed for an hour, and tinct: opii gtt. xiv. had been injected *per anum*. Only a pint of urine flowed through the catheter. In the evening he went into the warm-bath, and seemed to enjoy it very much. The catheter found no more than a pint of urine in the bladder.

From this time the catheter always passed easily with proper management, but the least want of care to elevate the point sufficiently in going through the prostate, always caused it to be obstructed on the posterior surface. I believe the instrument to have been obstructed by ulcerations in the gland, for, on examination from the rectum, I discovered the prostate to be diseased, and the patient was subject to occasional discharges of pus from the urethra, which pus I have no doubt came

from the prostate. The catheter was used night and morning regularly, and sometimes oftener, as the urinary secretion varied extremely ; sometimes not more than a pint would be formed in twenty-four hours, but I have frequently emptied his bladder at ten o'clock at night, and been called to him at four in the morning, and have then taken away six or seven or eight half pints of pale urine, that had a very offensive pungent smell, and at such times he always had the most painful desire to make water. These copious and sudden secretions were frequent, but returned at irregular periods, and seemed to be occasioned by several causes, some of which could not be ascertained. Indigestion was one cause: he was apt to eat voraciously; and swallow his food without masticating it. On his taking *oleum ricini*, after one of the foregoing attacks, I have sometimes observed undigested vegetable matter among the *fæces*. When first he began to go into the warm-bath it quite delighted him, but afterwards he took a dislike to it, without being able to assign any particular reason ; but if ever he went

into it by my desire, after he had taken a dislike to it, he was sure to have a copious secretion of pale pungent urine in the following night.

These sudden accumulations of urine operated very much to prevent the bladder recovering its tone; I therefore wished to instruct the servant man how to pass a flexible gum catheter without a stilet, but in that way I could not introduce it myself, and I dared not trust him to use an inflexible instrument, for fear of his injuring the urethra, so as to prevent my being able to pass the catheter. I then left a flexible gum catheter in the bladder, but was obliged to discontinue this plan, on account of its creating in the prostate gland violent irritation, which was propagated to the bowels, and kept up a constant purging, which could not be restrained by medicine. I made several attempts to keep a catheter in the urethra, but was compelled to give it up, for it never failed to cause purging. The irritation that existed in the prostate often produced tenesmus at other times. At last there was no way of

preventing injury to the bladder, but my sleeping in the house to be ready to draw off the urine, as often as ever there was an inclination to void it.

On the 4th day of the following December, the bladder had recovered its tone so much, that he could expel the whole of his water within an ounce by the natural efforts, and the disease of the prostate was so much lessened that bougies, or any kind of catheters, could be passed into the bladder without difficulty. The servant was then taught to introduce the catheter, and desired to take care that the bladder was completely emptied by means of the instrument once every day.

Some few months afterwards the servant informed me the patient could sometimes make water very well, at others he could not void a single drop without the catheter being passed. I saw the old gentleman make water, and then passed the catheter, but found no urine remaining, so that the bladder had then completely recovered its contractile power.

His ability, however, to empty the bladder by the natural efforts, varied so much, that it was found necessary to continue the use of the catheter at least once a-day, and this was never after omitted to the day of his death, which took place about two years after I first attended him.

ON THE USE OF SELF-BENDING CATHE-
TERS TO RELIEVE RETENTION OF
URINE, CAUSED BY ENLARGED
PROSTATE GLAND.

It is a good plan to keep the elastic gum catheters on stilets that are very much bent, for by their being retained in this shape for a long time, they acquire a degree of curvature of their own which makes them very superior instruments for some patients. Sir Everard Home writes, that there are some cases in which no kind of catheter can be passed but one of elastic gum which possesses a degree of curvature of its own, and which must be used without a stilet. He describes them to be instances of disease in the prostate, complicated with strictures in the urethra.

I have never yet met with a case wherein a flexible gum catheter could be intro-

duced without a stilet, in which I could not pass it with equal facility with one; and the following is an instance where I found it impracticable to make any kind of instrument enter the bladder, except one of these self-bending catheters used on a stilet;—it would not pass alone.

CASE.

An old gentleman who was my patient on account of disease in the prostate, being incapable of voiding his urine by the natural efforts, I taught him to use a flexible gum catheter upon himself; this he accomplished by merely pushing it along the urethra in the same manner as a bougie. He did this for a considerable time, and kept himself comparatively comfortable; at last, he did not succeed so well as formerly, and upon close observation it was found necessary to employ longer instruments, and then he had no more trouble than before. About nine months after this he experienced more than usual difficulty in drawing off his water, and the next day he could not introduce the cathe-

ter, and then I was sent for. I attempted to pass a catheter upon a stilet, but was foiled. I increased the curvature of the cannula by drawing back the stilet; still it would not go into the bladder. I then tried other catheters, but was equally unsuccessful. The patient was then desired to use fomentations and go into the hip-bath, while I went home for some catheters which had been kept for about two years upon stilets that were very much curved. Having returned to the patient, I tried one of these self-bending catheters without the stilet, but could not get it beyond the prostate. I then employed the same catheter on a stilet, and having passed it till it arrived at the same obstruction as before, I withdrew the stilet a little way to increase the curvature of the cannula, and it glided forward into the bladder without the slightest hesitation.

The course of the healthy urethra has frequently been examined, and probably is pretty well understood by all surgeons who have paid attention to the subject; but it appears to me, judging from the last

case, that very few of us have an adequate notion how much the course of the prostatic part of the canal may be altered by disease, and consequently how very much instruments may require to be bent before they can enter the bladder. In the case just related, a flexible gum catheter upon a stilet so much curved as to render it rather difficult to get it through the membranous part of the urethra, would not pass into the bladder; it would not pass even when the curvature of it was increased by partly withdrawing the stilet. To get an instrument into this patient's bladder, it was necessary to employ every possible expedient to turn the point of the catheter towards the linea alba, *viz.*, to use a stilet that was exceedingly curved; upon that a self-bending cannula, and, if withdrawing the stilet a little way had a tendency to bend the cannula more than it would have done itself, even that was indispensable to ensure success.

I now come to speak of a mode of using the self-bending elastic gum catheter, which I believe to be unknown to any except

those to whom I have explained it. Mention has already been made that a flexible gum catheter, long retained on a stilet very much curved, acquires a disposition to assume the same shape after having the stilet removed from it. If one of these self-bending cannulas be placed on a stilet of ordinary curvature, and the stilet be withdrawn about an inch or an inch and a half; if the catheter be then screwed round the stilet, that part which projects beyond the stilet will be seen to describe a circle of an inch, or inch and a half in diameter; because being unrestrained by the stilet, it naturally inclines to bend agreeably to the disposition which it possesses to remain curved.

Precisely the same effect may be produced upon this instrument in the urethra, and thus we may obtain a catheter with a point possessing any degree of flexibility we please, and the power of turning it in every possible direction to find out and penetrate any unnatural windings of the canal. Suppose one lateral lobe of the prostate has enlarged more than the other, it diverts the urethra from its natural course, and

makes it take a turn towards the side opposite to that of the enlarged lobe. Sometimes the middle lobe enlarges so much in its centre as apparently to divide the urethra right and left. Under either of these circumstances, that manner of using the instrument which has been just described, appears likely to find out, and carry the catheter through the turnings of the canal. Having hitherto always succeeded in getting a catheter into the bladder by some of the means previously noticed, I have no cases to bring forward in behalf of this new mode; but I regret it the less because the advantages of this method appear to depend upon such unerring principles, and become so self-evident upon a little reflection, as in my opinion to require no other proof of its utility.

Individuals, who are not expert in the use of the catheter, can have no excuse for omitting to keep by them at all times several flexible catheters upon stilets that are very much curved. Thus they will always have self-bending catheters, by employing which, without a stilet, they will be able to draw

away the urine in many cases which would baffle all their skill to introduce another kind of instrument. In general they should be so passed as to keep the point of the catheter close against the upper part of the urethra, till it arrives in the bladder. When that plan does not succeed, they ought to be propelled with a screwing motion gently along the canal, and thus I am confident many impediments may be eluded which otherwise would prove insurmountable obstacles to an unpractised operator. When no better instrument can be obtained, an elastic gum catheter which never has been curved sometimes succeeds very well, and brings away the urine, by being like a bougie pushed along the urethra without a stilet.

In speaking of the introduction of the inflexible catheter, I did not lay much stress on the utility of having a finger in the rectum, to elevate the point of the instrument into the membranous and through the prostatic parts of the canal; but it is an expedient attended with the greatest advantage, and sometimes in-

dispensable when a flexible catheter is being employed without a stilet, or when the stilet happens to be a very weak one, as must be the case in very small catheters. If a flexible gum catheter which has no disposition to bend of itself, be used without a strong curved stilet, it often cannot be passed into the bladder without a finger being in the rectum, to guide the point of the instrument through the membranous and prostatic parts of the urethra.

ON THE PROPER LENGTH FOR A CATHETER
TO RELIEVE RETENTION OF URINE,
CAUSED BY ENLARGEMENT OF
THE PROSTATE GLAND.

HAVING brought my observations on catheters almost to a conclusion, it occurs to me that the proper length for a catheter has not been mentioned. This often constitutes a most important consideration, for if it be not long enough to reach into the bladder, no matter how smooth it may be, or how correctly shaped, or how well it be introduced, it must be a useless instrument—nay, it may be worse than useless—for if it seem to pass into the bladder, and no urine come away, it may lead the surgeon into error; he may suppose there is no urine secreted, and that it is a complete case of *ischuria renalis*.

CASE.

Years ago, before I commenced practice, being in a part of the island far from any place where surgical instruments were sold, I was requested to visit an old man, who had been seen by a physician, who told him that his kidneys did not secrete urine, and had ordered for him *spt: ætheris nitros: g^{tt}. xxx. quartis horis*. The patient was fat to an amazing degree, and by my finger in the rectum, I detected the prostate gland to be enormously enlarged. There was tenderness in the hypogastric region; but this was not so evident as, most probably it would have been if the patient had been less corpulent. Every now and then there was hiccup, and violent straining to make water, without any being expelled. These symptoms convinced me that there was no *ischuria renal*, but that it was a decided case of retention of urine in the bladder.

A practitioner in the place lent me two

silver catheters, all that he possessed. One of them was a good instrument of the kind, but only ten inches long, and one inch of it was useless, having long side bows, which prevented it from entering the urethra, so that it might be said to be only nine inches long: the other was a very indifferent small instrument, thirteen inches long, and having an abruptly terminating flat point. The shortest of the two being every way the best catheter, if it had been long enough to enter the bladder, I made trial of it, and it passed with the utmost facility its whole length, but no urine flowed. I then pushed the penis back upon the instrument, and urged the latter on till the bows of it were close to the pubes, but still it brought no water away. This shewed the instrument was too short to enter the bladder. I therefore was under the necessity of using the other catheter. It went in readily till eleven inches of it were out of sight, and no doubt remained of its having gone into the bladder, because the urine rushed away most violently, both through the instrument, and also by the side of it—the

point of it, however, seemed to rest against something that would throw back the catheter in a moment, if I ceased to press it forward. I therefore wished to make the instrument pass a little further into the bladder, for its point to be at perfect liberty in the cavity of that viscus. With this view I pressed on the catheter a little more, and suddenly it appeared to penetrate a soft substance, the urine ceased to flow, and only a few drops of blood came down the instrument. I then drew back the catheter to the same point at which the urine escaped, but none came again. I then removed the instrument from the urethra, and after washing it, introduced it again and again. I employed every possible manœuvre, but never could get more urine away. I wished to puncture the bladder above the pubes, but this was not permitted to be done; and before other catheters could be procured, the man died.

It is much to be regretted that the want of proper instruments, but above all others, an assortment of good catheters, is a

neglect which greatly prevails among provincial practitioners. The above patient appeared to me to have been lost very much owing to my not being able to procure good instruments, and I have great reason to believe that many lives are continually being lost to society for want of suitable catheters.

I write this from no other motive than to excite attention to the subject ; and, to be still more impressive, I have no hesitation in asserting, *there is no operation in Surgery, in which the quality of the instruments is of so much importance—oftentimes the catheter cannot be introduced unless it be the best of that kind which is exactly suited to the case* *. To repeat what ought to be never-failing properties of a catheter—it should be perfectly cylindrical ; every part should be as smooth as possible, and the point should be as perfectly hemispherical as it can be made. The surgeon should always select an instrument of the largest

* Excellent catheters of flexible gum may always be procured from Millikin, Chirurgical Instrument Maker, No. 301, Strand.

diameter that can be introduced, and, as to length, whenever the retention results from disease of the prostate, the catheter had better be at least twelve inches long. I have already mentioned how the tube of the urethra was lengthened in one patient by its passing through an excrescence that grew all round the internal orifice, and the last case forcibly inculcates the necessity of using long instruments of large dimensions. The shorter catheter could not reach the cavity of the bladder—the small long one entered and held back a soft tumor which lay against the urethra—so long as the tumor was pushed away from the internal orifice the urine flowed, but on a slight attempt being made to carry the instrument further into the bladder, it penetrated the substance of the soft excrescence, and although the eyes of the catheter were afterwards drawn back out of the tumor, as there was then nothing to prevent the tumor from pressing against the orifice of the urethra, no water could escape. The instrument was passed again and again, but as it always entered the wound in the morbid growth, it could prove only unsuccessful.

ON THE USE OF BOUGIES TO RELIEVE
RETENTION OF URINE CAUSED BY
ENLARGED PROSTATE GLAND.

REFLECTING upon the case, the relation of which terminated on the last page, it has often occurred to me, that if a very large wax bougie had been introduced and been left in, the urine would have found a way by the side of it, for an instrument of that kind must have straightened the canal a great deal; besides which, it would have pushed the fungous tumor away from the orifice, and have given the urine access to it. In the third case back from the one now under consideration, it will be recollected, there was much difficulty in getting a catheter to enter the bladder, and this was not effected till after a bougie had been passed. If I had not succeeded with the catheter

at the time that I did, it was my intention to have again passed the large bougie, and have allowed it to remain there to give the urine an opportunity of escaping between it and the urethra. I have never seen catheters so large as the largest bougies, therefore unless catheters are for the future made of a larger size than they hitherto have been, I can readily imagine there may be some cases of valvular projection of the prostate, in which some practitioners may be able to introduce a very large bougie, when they cannot succeed with a catheter. The mode of using a bougie is much more simple*. It only requires to be made soft by the warmth of the hand, to have a degree of curvature given to it, and then* to be very slowly pushed along the urethra. Time must be allowed for it to conform to the shape of the passage. Its broad point makes it much

* Many observations on the course of the urethra, and the mode of passing instruments along it, have been purposely omitted in this Essay, because they may be seen minutely detailed in the Fifth and Sixth Sections of the Author's Practical Essays on Strictures of the Urethra, and Diseases of the Testicles.

more likely to push back any valvular projection of the prostate than it would be to inflict a wound, and consequently with such an instrument we may venture to use more force than could be done with any other. But to fit a bougie for an operation of this nature, it requires the point to be bent up to a great degree, otherwise it may rest against the lower part of the valvular projection, and have no tendency to turn up between it and the anterior part of the bladder. These observations presented themselves to me before I was acquainted with Mr. Hunter's work on the Venereal Disease; and although I have frequently been in the habit of consulting that valuable book, the following case which it contains never attracted my notice till the day before writing these lines, when I was agreeably surprised to find that Mr. Hunter had met with a case exactly similar to the last mentioned, and that he had formed precisely the same conclusions as to the utility of the large bougie, and confirmed the truth of them by actual practice.

CASE.

“ A gentleman was attacked with a suppression of urine ; a catheter could not be passed, but a bougie relieved him. He continued well for five years ; but the same complaint returning the bougie could not be passed, and the disease was supposed to be a stricture. A catheter however passed, although with a good deal of difficulty ; and the bougie, though often tried, could not be passed, excepting once just after using the catheter. I was sent for, and tried the bougie with as little success, and was obliged to have recourse to the catheter. I passed it with great ease, and the water was drawn off. The late Mr. Tomkins, who had Daran’s bougie, was called ; but he was not more successful, and was obliged to have recourse to the catheter ; but such violence was used as caused a good deal of blood to come from the urethra, and after all it did not succeed. I was again consulted, and passed the catheter, but with much more difficulty

than before, which made me believe that the passage had been a good deal torn. Upon taking out the catheter I passed a large bougie into the bladder with great ease; this I allowed to remain for three days, and the patient made water tolerably freely by the side of it. The moment I drew out the bougie I attempted to pass another, but did not succeed, although I gave it the natural bend of the passage. Upon withdrawing those bougies which did not pass, I observed that all of them had a bend at the point, contrary to the direction of the passage; this made me suspect, that the place which stopped the bougie, was on the posterior surface, and that by being pushed on, it bent forwards into the passage, and of course the point turned back. I, therefore, took a thick bougie; and, before I introduced it, I bent the point almost double, so that it could not catch at the posterior surface of the urethra, where I supposed the stop to be; this point of the bougie rubbed all along the anterior and upper surface of the urethra, by which means it avoided catching on the posterior

surface, and it passed with great ease into the bladder. He made water by the side of the bougie, as before. By giving the bougie this bend he was able for the future to pass them with great ease."

ON THE FORCE TO BE USED IN PASSING
INSTRUMENTS ALONG THE URETHRA TO
RELIEVE RETENTION OF URINE.

THE degree of power which should be employed in urging instruments through the urethra, can only be expressed in general terms, that it ought never to be such as would be likely to injure the canal if the point of the catheter were ill-directed. This, however, must be left solely to the judgment of the practitioner. I once introduced a silver catheter upon an old man, and the degree of strength necessary to be exerted on that occasion, together with the sensation communicated to my hand by the instrument, made me stop several times, from fear that it was pursuing a wrong course; and at this time I am called upon occasionally to pass an instrument upon a patient who has several

obstinate strictures which require so much force to penetrate them, that I certainly durst not make use of it, if long experience had not rendered me well acquainted with the nature of the case, and given me a measure of confidence which could be no otherwise obtained. Should the operator feel doubtful as to the course the catheter is taking, I conceive the best way of satisfying himself of this will be to withdraw it a little way, and if it has been making a passage for itself, then we may expect it will come back more easily than it entered; but if the difficulty only results from some part of the canal griping it, then it will most probably be equally difficult to move either backwards or forwards. Here permit me to refer to that case which has been already mentioned, to shew that a bougie well anointed with lard, having been previously passed through the urethra, will sometimes materially facilitate the introduction of a catheter.

ON THE POSITION OF PATIENTS WHILE
HAVING INSTRUMENTS INTRODUCED
ALONG THE URETHRA.

Nothing having been said as to the proper position for a patient to be placed in whilst having a catheter passed, it may be remarked, that in all cases of difficulty the surgeon ought to suit his own convenience, and have the patient straight before him ; thus situated, the operator will always have most confidence, and of course act to the greatest advantage. The patient had better stand up with his back against a wall, if he be able, or he may sit in an armed chair, resting as near as possible to the edge of the seat, or, lastly, he may lie with his body across the bed, having his legs over the side, and his feet supported on chairs, while the surgeon

stands between them. But if the urethra be perfectly free to admit the catheter, then it may be desirable to use it while the patient lies upon his side; as, for instance, in case of the spine being diseased. Under these circumstances it is proper, in passing the instrument, to incline the handle to one side of the *linea alba*, till it comes opposite the inferior *linea semilunaris*. This is rendered necessary by the *trochanter major* projecting more than the *costa ilii*, so that, when these two parts rest on the same level, it throws the bulb of the urethra farther from the bed than the posterior part of the canal. If the catheter can be introduced with facility whilst the patient rests upon his side, it will be the preferable mode, being the most cleanly; as in that position it is far more easy to protect the bed from the urine.

These observations on the situation of the patient were not sooner offered, because they seem to be most applicable during the treatment, after the urine has been got away in the first instance. The

paralysis of the bladder, which often results from the over distention of it, gives occasion for the frequent use of the catheter, and then, of course, it becomes more an object to study the convenience of the patient.

ON THE TREATMENT, AFTER RETENTION
OF URINE HAS BEEN REMEDIED,
BY THE CATHETER.

THIS must vary, according to the nature of the cause which produced the retention, and the effect which the latter may have had upon the parts or constitution.

CASE.

A boy about twelve years of age had a fall, and hurt his head. A physician saw him a few times, and having discovered that he had retention of urine, requested a friend of mine to introduce the catheter. I accompanied my friend to see the patient, and he drew away a considerable quantity of high-coloured urine. On our way home I suggested, that as the boy had a dry, brown furred tongue, the retention pro-

bably resulted from a disordered state of his bowels, which would be relieved by purging. The urine accumulated again, and was a second time removed by the instrument. He was then freely purged with hydrarg: submur: et pulv: jalapii, which brought away a quantity of green and black fæces, after which he voided his urine naturally.

Except, however, in cases where the patients require purging, we have commonly only to direct our attention to allay any existing inflammation, or else to sooth irritation, and recruit the exhausted powers of the system. If there be inflammation, it may be right to employ venesection, cathartics, cooling saline medicines, and the warm bath, as particularly noticed in treating of cystitis. On the contrary, if the patient have suffered much, been long without sleep, have a small weak pulse, and great prostration of strength, most probably an opiate ought to be given, and perhaps it might be well to let him go into the warm bath, and then be made as comfortable as possible in bed for some hours ;

after which he must have mild, nutritious food, and be otherwise managed as shall seem to be best calculated to restore the general health.

But the subject which more especially demands consideration in this place, is the treatment of the bladder, to prevent the recurrence of retention of urine.

If, the retention have been occasioned by spasm of the sphincter vesicæ, brought on by wilfully holding the urine after a violent desire to discharge it has been excited, or by the temporary operation of some other cause that has ceased to exist, then it commonly happens, that after once emptying the bladder by the catheter, warm bathing will prove sufficient to prevent a second retention. But when the retention of urine has existed for a long period, or the bladder has been enormously distended, a remarkable instance of both which occurring in the same patient, has already been related, then, as in that case, the tone of the bladder will have sustained such a degree of injury as will require

some time to elapse before it can be restored, and until that is effected, the urine will be certain to accumulate in the bladder, for want of expulsive power to throw it out, unless this be prevented by the interference of art. It is absolutely necessary to employ suitable means for this purpose, otherwise the bladder, always containing some urine, never will regain the power of contracting completely.

Against this accumulation the catheter is the only remedy ; and the question to be decided is, whether the instrument had better be allowed to remain in the bladder, or be introduced only as often as there may be a desire to make water. Very able surgeons have advocated both these plans, but the general opinion of the present day, favours, the occasional use of the catheter, because it is thought to restore the contractile power of the bladder in the shortest time. If we were obliged in every case to adopt one of these plans to the entire neglect of the other, I should certainly have no hesitation about preferring the last mentioned ; but I am persuaded

the most benefit will accrue from the judicious employment of both. During some days after first getting away the urine, I would always (if it be possible) prevent the slightest degree of distention to the bladder, and this can only be accomplished by the catheter being left in. But when that viscus has had a certain degree of complete rest, which ought to vary according to circumstances, then I imagine it will regain the natural power of contracting most speedily, by that function's being cautiously exercised ; and this should be effected by drawing off the water only so often as the patient feels a desire to part with it.

When the bladder has been over distended, it must be in the same state as any other part that has sustained a similar injury, and certainly ought to be treated upon the same principles. If parts be stretched, no matter how little, beyond that degree which will leave them in a state as perfect as that in which they previously were, they will then receive a mechanical injury that must affect their conti-

nulty ; and, for the reparation of such an injury, the most complete rest that can be obtained is of all things the most indispensable. The solution of continuity which takes place in almost every sprain that comes under our observation, is made obvious by sudden and great tumefaction, with discoloration, the effect of vessels being torn, and blood being extravasated, which subsequently occasions inflammation. In the treatment of such cases we have two objects in view ; to subdue the inflammation, and to promote the union of the lacerated parts ; and to accomplish these, rest is, of all things, the most indispensable ; for, unless the parts remain quiet, and free from irritation, the inflammation will continue ; and unless the divided parts be quiet, and in contact, they cannot unite. But when sprained parts have thus far recovered, any remaining imperfection in their original powers will be most certainly restored by proper exercise. Precisely the same principles ought, in my opinion, to regulate the use of the catheter after retention of urine has once been relieved ; for the in-

flammation which is known to ensue, and the extravasation of blood which is almost always observable in the bladders of those who die from retention, are two sufficient proofs of that viscus being left in exactly the same state as other parts are when they have been sprained. Another argument, which appears to me no trifling one, in favour of the catheter being allowed to remain introduced, is the great uncertainty with which the urinary secretion is sometimes afterwards performed.

CASE.

“ In January 1787, I was desired to visit an old gentleman forty-five miles from Leeds, who was labouring under retention of urine, and could not any longer be relieved by the surgeon who attended him. I arrived at three in the morning, and found a physician with him, as well as the surgeon, waiting my arrival. The latter gave me the following history of the case: That Mr. M. having been seized with a retention of urine, betwixt three and four

weeks before, he (the surgeon) had extracted the urine without difficulty, and had repeated the operation twice, and sometimes thrice in the day, during three weeks. He then began to find some obstruction in the urethra, near the prostate gland, which increased at every operation, till he was unable any longer to introduce the catheter. The patient had now been three days without relief, and the bladder was largely distended. Upon introducing the catheter, its point, when it had approached the prostate gland, passed into a substance that felt ragged and fibrous. I had no doubt, from this sensation, that the posterior side of the urethra was perforated. The object now was, to keep the point of my catheter close to the anterior side of the urethra, as it passed through its membranous part, that I might avoid the wound, which the point of the instrument entered with readiness. The stilet of my flexible catheter which I first used was rather too weak, I therefore bent a silver catheter, at the distance of about an inch from its point, that, having a greater curvature than usual in that part, I might be

enabled to keep the point of the instrument more closely in contact with the anterior part of the urethra, and thereby pass over the wound made in the posterior side of that canal. This method, assisted by the mode of introduction already described, was attended with success, and I drew off about four pints of urine.

“As I could neither stay with my patient, nor leave him with propriety in this situation, I thought it necessary to introduce an elastic gum catheter, which might remain in the urethra till the wound should be healed. I procured some brass wire of a proper thickness, with which I made a stilet, and having given it the same curvature as that of the silver catheter with which I had extracted the urine, I introduced it about four hours after the former operation, and fixed it by tying it to a bag truss put upon the patient.

“It is remarkable that I drew off *a quantity of urine* from the bladder, that had been emptied but four hours before, *nearly equal to that* which was found in

the bladder after the retention had subsisted three days."

The preceding is the fourth case related by the late Mr. Hay, of Leeds; but the same thing occurred in some of the others. In the ninth case which he has recorded, the urine was first drawn off in the evening, and measured four pints: on introducing the catheter again next morning, the urine somewhat exceeded four pints; so that the bladder at that time must have suffered more distention than it had done previous to the catheter being used, and consequently it would have been much better to have prevented this recurrence by retaining the instrument in the bladder.

When speaking of the advantages of the elastic gum catheters, it will be remembered that I mentioned the case of an old gentleman, from whom I drew off ten half pints of urine in the first instance; and very frequently he had such a rapid secretion of urine, that six hours after having emptied his bladder, I have been sent for suddenly, and found eight half-pints of urine

to come away. (Vide page 198). He was six months before he could void all his urine by the natural efforts ; and I have no doubt the cure was very much protracted by the bladder being so frequently over-distended, because, after I slept in the house, to be ready to relieve him in one moment, he experienced a progressive amendment. He lived little more than half a mile distant from me ; but although the distance was so short, and there was no culpable neglect in sending to me, the secretion was so rapid, that to prevent the over-distention of the bladder, there was no alternative but my remaining in the house all night, as the catheter could not be retained in the bladder, on account of it exciting violent purging. To shew one instance of the good effect of leaving the catheter in the bladder, I may refer to that case which immediately precedes the one just mentioned—the retention, it will be recollected, had continued four days, I drew off eight half-pints of urine—the catheter was left in, and the bladder perfectly recovered itself in a week.

Should there be much difficulty in passing the instrument, that will form an additional reason for keeping it introduced ; and if the patient lives at a great distance from his surgeon, and none of the family can be taught to use the catheter on him, in that case it must be left in. Upon the whole, therefore, I think it most advisable in all cases where the bladder has been greatly distended, to retain the catheter in it for a few days at least, and after that time it may be used once or twice a-day, or still more frequently, if the patient feels a desire to part with his urine. In the first instance, however, it should not remain in the bladder more than three days without being taken out to see if any calculous matter be forming upon it ; and when that happens, the instrument must be removed every two or three days, and after being cleaned, it may be replaced ; but if the urine come through it freely, and it be known that no incrustation is forming upon it, then it need not be taken out again for a week, or perhaps a longer time. ' Wearing the catheter ' generally

causes a great deal of mucus to be poured out from the urethra after a few days, but this effect is of no consequence, and soon goes off again when the instrument comes to be employed only occasionally. The silver catheter lying in the urethra has been known to cause pressure and consequent sloughing at the pubes, but the flexible gum catheter is not liable to this objection. Sometimes the catheter creates so much irritation about the prostate, that however desirable it may be on other accounts to keep it introduced, it cannot be supported; of course, it must then be passed more or less frequently, according to circumstances.

When a catheter has to remain in the urethra, it is necessary for it to be secured against either being thrown out of the bladder or drawn into it. Different contrivances have been adopted for this purpose, but the following appears to me the most simple, and every way the most convenient. Fasten some very strong silk or sewing thread (nothing better than dentists' silk), three or four double, by tying it pro-

perly to the rings of the catheter, so as to make two bows of the thread, each about two inches long, and on opposite sides of the catheter, The instrument being introduced, the bows of thread will pass along the sides of the penis; a strip of emplastrum adhaesivum is then to be passed through these bows, and afterwards made to encircle the penis several times. It must be passed round the penis so lightly, that it shall form no stricture upon it: the security to be derived from it must result entirely from its adhesive property. By this method, not more than half an inch of the instrument need project beyond the extremity of the urethra, and the penis will allow of being turned about, as may suit the convenience of the patient. So long as it may be an object to preserve the bladder empty, the end of the catheter must be kept open, and some vessel must be placed to receive the urine constantly as it flows off. If the patient rest on the back, then a urinal may be placed between his thighs, having the penis bent down into it; but if from any cause, he be compelled to lie on his side, then some

other plan must be adopted. If it so happens, that some difficulty occurs in keeping the end of the penis in the vessel which is placed to receive the urine, a piece of tape or narrow strip of linen had better be attached to the end of the catheter, and be extended thence into the urinal. This, well managed, answers very effectually to preserve the bed dry. Supposing, however, that the wearing of the catheter, is only necessary to guard against enormous and sudden accumulation of urine in the bladder, then the patient may have a small brass stop-cock fixed on the catheter, or he may use a plug, which he can take out and replace at his own pleasure.

We must judge of the returning power of the bladder by letting off the urine only occasionally, and by then observing the degree of force with which it seems to be expelled ; and to ascertain if that viscus has regained the power of emptying itself completely, the catheter must be left out for the urine to accumulate, and after the patient has voided all that he can

by the natural efforts, the instrument should be introduced to see if any urine still remain to come away.

Whether the catheter be worn constantly or only used occasionally, it must never be totally laid aside, till the bladder can throw out the last drop of urine solely by the natural efforts ; and until that takes place, it will, in my opinion, be right to ensure the complete evacuation of the contents of the bladder, at least once in every twenty-four hours, by passing the catheter.

ON PUNCTURING THE BLADDER TO RELIEVE RETENTION OF URINE.

It sometimes happens that all the foregoing means prove inadequate to get away the urine, and this renders an operation necessary, as being the only chance of preserving the patient's life. It remains, therefore, to describe the kind of operation best suited to each particular case, and the proper time for undertaking it. But the following quotation, from the works of that animated writer, the late Mr. John Bell, of Edinburgh, contains so many apposite remarks, that I shall introduce it previous to making any further observations.

“ When this viscus is dilated in the utmost degree, and neither its own structure, nor the space in the abdomen, can allow a further distention ; either the bladder must be lacerated, which it never is, so equally

is it supported by the pressure of the surrounding parts ; or its orifice must expand, and the urine begin to flow. After the third day of the retention, the urine often really begins to flow, and whatever descends from the kidneys is evacuated in small quantities from time to time ; and at this period, the bladder is distended in as great a degree as it ever can be, however long the patient survive. This dribbling of the urine, which begins when the bladder is dilated to the utmost, and continues till the eighth or tenth day, or till the bladder sloughs, has long been understood, and is named by the French “ *uriné par régorgement*.” To practitioners who do not understand it, the occurrence is a most deceitful one. The friends felicitate themselves, that the urine begins to flow ; the surgeon believes it, basins, and cloths wet with urine, are easily produced, but the patient lies unrelieved. The continued distention of the bladder is followed by universal inflammation of the abdomen. The insensibility, and low delirium of incipient gangrene, are mistaken for that relief which was expected from the flow of

urine, till either hiccough comes on, and the patient dies of fever and inflammation, or the urine gets through an aperture, formed by mortification, into the abdomen. Let no surgeon, therefore, trust to the reports of nurses and friends, but lay his hand upon the hypogastric region, and tap with his finger, that he may distinguish the distended bladder, and the fluctuation of urine. As the bladder suffers no further distention, after the third day, why should it burst? Not from laceration, for it is supported by the uniform pressure of the surrounding viscera ; not by yielding suddenly, for it is distended to its utmost on the third day of the retention, and yet seldom gives way before the tenth ; not by attenuation, for it becomes thickened. The term laceration never was more wrongly applied than in this instance ; for, when there is a breach in the bladder, it is found, on dissection, to be a small round hole, such as might be covered with the point of the finger. The rest of the viscus, and the adjacent bowels, are red and inflamed, while this single point is black, and mortified ! Delay is more dangerous than even

the worst modes of making an opening into the bladder, and while life exists, the patient should have his chance *."

It is the same with the operation of puncturing the bladder as it is with that for strangulated hernia, the want of success generally results from its having been delayed too long. It is therefore of the utmost importance that the operation of puncturing the bladder be performed as quickly as possible after it is decided to be necessary. No time can be laid down for operating, our judgment on this point must always be influenced by the symptoms indicative of the state of the patient; the duration of the complaint becomes important only in proportion to the effects it has produced, and these take place under different circumstances at different periods; a complete stoppage of urine is of course to be more dreaded than a partial one,

* I have termed it a quotation from Mr. John Bell's *Principles of Surgery*, but it is in reality taken from the *Surgical Dictionary* of Mr. Samuel Cooper, who has judiciously given the ideas of that author in a condensed form, retaining in most places the very words of the original.

&c. &c. I have related one case, which, it will be remembered, terminated fatally in twenty-seven hours from its commencement; and I have also given another in which, after the lapse of four days, the state of the patient was such as induced me to defer the operation several hours, to try other means which fortunately succeeded, and during all that time, the patient had suffered so little, even though the bladder had been distended to hold eight half-pints of urine, that he was quite well again in a week. If the patient be comatose or have hiccough, no matter how early these symptoms appear, there will be no time to lose, the operation should be performed instantly. On the contrary, cases may occur after the lapse of three or four days, when, if the surgeon have not seen the patient sooner, it may be right for him to wait a few hours longer, to see the effect of other remedies before puncturing the bladder; the niceties of every case must be left to the judgment of the practitioner, but let me repeat, the safest plan in doubtful cases always is to operate early.

There are three points at which we may perform the operation of puncturing the bladder; *vis.*, from the rectum or in the perinæum, or, thirdly, between the pyramidales muscles, above the pubes; and under particular circumstances each may deserve the preference. Should the prostate gland be so much enlarged as to prevent the bladder being distinctly felt from the rectum, the operation then is inadmissible, either from the bowels or the perinæum; it must in such cases be performed above the pubes. On the other hand, if the bladder be contracted, and do not distend sufficiently to rise above the pubes, then one of the other two places becomes the fittest for the operation. If, indeed, it be likely the patient will require to void his urine for a long period through the artificial opening, then, as a cannula must be worn constantly during the whole time, the operation above the pubes is always to be recommended if practicable; but if there be reason to suppose that the natural passage will shortly be restored, and the bladder can be distinctly felt from the rectum, we ought to puncture there,

for the operation per anum is the least difficult, least painful, affords all the relief required, and occasions the least trouble till the urine again flows through the natural passage. It sometimes happens that retention of urine, occasioned by a stricture, may be relieved by cutting into the urethra behind the stricture; if this have been unsuccessfully attempted, the operation of puncturing from the perinæum, ought to be performed, but under any other circumstances I conceive it will always be preferable to operate either from the rectum, or above the pubes.

ON PUNCTURING THE BLADDER FROM THE RECTUM.

THE patient is to lie upon his back, having his thighs raised and bent upon the trunk, and the anus must be close to the side of the bed, and immediately in front of the surgeon. The operator must next, if it be possible, introduce two fingers into the rectum, far enough to reach the most projecting, and, consequently, the lowest, part of the bladder. The cannula of what is termed Pouteau's trocar is next to be introduced upon the fingers, and by their means held against the centre of the most depending part of the bladder, while with the other hand the surgeon carries the stilet along the cannula, and pushes both of them into the bladder. This done, the piercer must be withdrawn to let off the urine, and then the

cannula may also be removed. One of the internal hæmorrhoidal arteries of considerable size can often be felt running between the rectum and bladder; therefore in the introduction of the trocar, this vessel should be carefully avoided.

It has sometimes been thought necessary to retain the cannula in the bladder, for fear of the wound's closing, and rendering a repetition of the operation necessary; in general, however, there are no grounds for such an apprehension. After this operation, the bladder usually retains the urine till a desire to evacuate it comes on, and then the wound opens and the water is discharged through it; but even if the wound should close, the operation is so extremely simple, that a repetition of it would, I imagine, be productive of less inconvenience than what must arise from retaining the cannula in the bladder. There is a circumstance, however, which forms a strong argument for the cannula being retained in the wound in some cases; and I am much surprised to find no author has noticed it. I allude to the operation

having been delayed till the bladder has lost its power of contracting; this may happen by the surgeon not seeing the patient time enough to prevent it. In such a case, it certainly will be right to retain the cannula in the bladder; otherwise, although the wound might open and let off the urine whenever the quantity of it created inconvenience, this would not occur till the bladder was distended nearly equal to what it was at the time of the operation; to which there would be serious objection, because every accumulation would prove an injury to the bladder, and prevent the restoration of the contractile power. But, under those circumstances, I very much doubt whether the urine would be discharged without the cannula; for, if two quarts of urine came away at the operation, so much time might elapse, before so large a quantity could be formed again, the wound would be very likely to heal: and, even if this did not happen, the urine could not be entirely evacuated; for, as soon as the bladder was relieved to a certain extent, there would be no power to prevent the wound closing upon the urine. When, however, the bladder has

not been sprained to destroy or materially to lessen the power of contracting, then, certainly, the cannula had better be removed immediately after the urine has come away.

CASE.

“Sept. 3, 1807.—A middle-aged man was admitted into the Leeds infirmary for a retention of urine. He had experienced some difficulty in making water during the last twelve months, and the urine had flowed in a small stream; but he had always been able to assist himself till this morning. The retention was now complete. Being unable to introduce either a catheter or bougie into the bladder, I determined, in the evening, to puncture the bladder through the rectum. When my finger was introduced, he felt a strong motion for a stool; and upon withdrawing my finger he had an evacuation of liquid fæces, and voided some urine by a stream through the penis. On this account I deferred the operation, and ordered him a bolus with calomel gr. x, and opium gr. ii, to be taken at bed-time.

“ Sept. 4.—He made a little urine ; but his bladder remained hard and distended. Pulse calm. Gave the calomel and opium twice in the course of the day ; and during the night he took four grains of opium alone, divided into four doses.

“ 5th.—In the same state. A catgut bougie seemed to pass at one time into the bladder, but afforded no relief. In the evening I punctured the bladder, and withdrew the cannula as soon as the urine (in quantity two pints) was evacuated.

“ 6th.—The wound in the bladder was completely healed ; nor could I find the orifice, by pressing the point of a catheter against that part of the rectum which had been punctured. No urine had flowed through the anus after the cannula was withdrawn. He could expel a portion of his urine through the urethra ; but could not empty the bladder.

“ 7th and 8th.—Continued in the same state. Pulse calm ; generally betwixt 60 and 70, never exceeding 80.

“ 9th.—He had made three pints of urine during the last twelve hours, and in the course of this day he discharged an equal quantity ; yet the size of the bladder was not diminished. I thought it improper to suffer the bladder to remain in this distended state, and, therefore, repeated the operation, and drew off by the cannula a quart of urine. The cannula was now left in the bladder, secured by a proper bandage.

“ 10th.—Pulse continued calm. I allowed the patient a more generous diet than that to which I had hitherto confined him.

“ 12th.—The cannula came away in the evening, as the patient sat on the close-stool, and was not replaced.

“ 13th.—No urine flowed through the rectum, but he made water in the natural way. The bladder, however, began to grow distended ; but in the course of the day distention ceased, and the whole of the urine seemed to be expelled.

“ 14th.—In the evening the urine was again expelled through the anus, and the power of making water by the natural passage ceased. In this state the patient continued for a whole week, no urine flowing through the urethra, except twice in a small quantity.

“ A flexible gum catheter was introduced, and was retained in the bladder a week. A large quantity of mucus, slightly tinged with blood, was discharged every day along with the urine, which, during the first three days, was also bloody.

“ 29th.—I withdrew the catheter. The retention of urine did not return; but the patient recovered his strength rather slowly. His urine was voided with pain, and it deposited a large quantity of tenacious mucus, as long as he remained in the infirmary. He afterwards regained a good state of health.”

The foregoing case shews how quickly the wound in the bladder may sometimes

heal, and render it necessary to repeat the operation. It also shews, when this does occur, the utility of keeping the cannula in the bladder for two or three days, as after the lapse of that time the wound remains open and free to admit the urine through it. But although the wound in this instance healed so speedily as to prevent the escape of any water through it after the cannula was withdrawn, yet I conceive it affords no just grounds of hesitation about removing the cannula in the generality of cases, because it will be seen the patient could expel a portion of his urine through the natural passage, and when that power returns, we always expect, if not wish, for the wound to heal. At the same time, however, that it forms no objection to the removal of the cannula in general, yet, in my opinion, it forcibly points out the impropriety of its being done indiscriminately, especially, as I have already mentioned, in cases where the bladder has lost its tone. It is very possible for that to have been partly the cause of the wound

healing in this instance: the man had disease of the prostate, which very frequently injures the contractile power of the bladder.

OF PUNCTURING THE BLADDER ABOVE
THE PUBES.

IN performing this operation an incision is to be made in the direction of the linea alba, and carried on till the surgeon can pass his finger between the pyramidales muscles, and feel the distended bladder. A trocar is then to be introduced close above the pubes, and made to pass in a direction obliquely downwards and backwards. The urine being let off, the cannula is to be retained in the wound, by means of some tape passed through the rings or holes of the cannula, and tied round the body.

Mr. Sharpe, in his Critical Inquiry, cautions us against using the cannula of too great a length, stating, that from inattention to this circumstance, the cannula

in one of his patients made its way into the rectum, by exciting ulceration on the posterior surface of the bladder. In avoiding this error, however, we may, without some care, fall into another, and have the cannula so short, that when the urine is discharged, the contraction of the bladder, under the pubes, may draw it off the cannula, and then there may be some danger of the urine escaping from the bladder, and being injected into the cellular membrane about the pubes. By having the trocar and cannula considerably curved, a much longer instrument may be used than otherwise could be done with safety, and thus we may avoid the danger of the bladder being drawn off the end of the cannula; and if a second cannula, having a round end with holes to admit the urine, be passed through the former one, we shall materially lessen any danger that might arise from the sharp edges of the larger one. I think, however, that even this plan may be improved upon, by introducing a flexible gum catheter that has acquired a degree of curvature of its own. It should be large enough to completely fill the can-

nula, and be so passed as for it to bend under the pubes, and reach as low as the internal orifice of the urethra. In this manner we may draw away the last drop of urine; the instrument will not make any pressure towards the rectum to endanger ulceration; and by the cannula completely filling the wound, there will be no reason to fear the urine getting into the cellular membrane; and further, by the catheter filling the cannula, and having its end plugged, the patient may void his urine whenever he pleases, and keep himself perfectly dry during the intervals. All those remarks which were made on the subject of the catheter incrusting with stony matter when left in the bladder, are equally applicable to the present case.

When there is a free external opening there will be less reason than is commonly imagined to fear the urine will get into the cellular membrane; but, as Mr. Abernethy very prudently suggests, "the operator should be cautious not to make

any separation of the bladder from the back part of the symphysis pubis, that there should not be even a cavity, into which the urine might gravitate." The following interesting case is taken from his Surgical Observations.

CASE.

A gentleman between sixty and seventy years of age had retention of urine from an enlarged prostate, which rendered it necessary to puncture the bladder above the pubes. "After I had, by an incision two inches in length, between the pyramides muscles, enabled myself to pass my finger along the upper part of the symphysis pubis, so as to press against the distended bladder, I introduced a common trocar of the middle size, in a direction obliquely downwards. There is an advantage, as Sabatier, in his *Medécine Opératoire*, observes, in introducing an instrument in this direction, for it accords with the axis of the bladder, and is therefore not likely to injure the opposite side of that organ.

When I found that the instrument had penetrated the cavity, I withdrew the stilet within the cannula, and then pushed the cannula obliquely downwards, so that about two inches of it were introduced into the bladder. On withdrawing the stilet of the trochar, the urine gushed out with great force, but I prevented its escape, by placing the thumb of my left hand against the mouth of the cannula, and then introduced through it in the same oblique direction, a middle-sized hollow elastic catheter, till it met with resistance by touching the bottom of the bladder. After the urine was discharged, the cannula of the trocar was withdrawn over the elastic catheter, which was left in its situation, and the end which came out of the wound was bent downwards towards the pubes, and attached, so as to be kept motionless, to a circular bandage put round the body of the patient. The wound, which was funnel-shaped, being wide externally, and gradually contracting to the bladder, was covered with linen, spread over with spermaceti salve. The urine flowed not only through the catheter, but

by the sides of it. A slight inflammation occurred round the wound, such as would doubtless tend to consolidate the surrounding cellular substance. The surface of the wound, in this case, did not even slough, at least in any evident degree. Four days after the operation the patient got up, and walked about his chamber, and feeling himself comfortable and well, he did not go to bed again till night. At the end of a week, some few drops of urine came through the urethra, and the quantity thus discharged daily increased. At this time, as the catheter seemed to be clogged up with mucus, it was withdrawn, and another was introduced with perfect facility. In about three weeks, as the urine came pretty freely through the urethra, the catheter was withdrawn, and the patient voided his urine by the natural channel. In six weeks the external wound was perfectly healed, and the patient was as well as before the retention of urine took place."

I shall conclude what I have to say upon this operation, by observing that several authors have recommended the puncture

to be made at some distance*, such as an inch or more above the pubes, and for no incision to be made previous to the introduction of the trocar†; but very little thought will enable any one to perceive the impropriety of this advice. Puncturing at a distance above the pubes, independently of the danger of wounding the peritonæum, increases the liability for the contractions of the

* Mr. Samuel Sharpe, in his *Critical Inquiry*, says, the trocar should be introduced *an inch and a half above the pubes*.

† Sabatier in his *Medécine Opératoire*, (page 63), and Desault, in his *Œuvres Chirurgicales*, (par Bichat, tom. iii., page 318), both recommend the trocar to be pushed in above the pubes, without any previous incision being made. Sabatier, having mentioned that a curved trocar ought to be used, continues, “ Pour se servir de cet instrument, on fait coucher le malade sur le côté droit de son lit, la tête et la poitrine un peu élevées, et les cuisses légèrement fléchies. Le chirurgien appuie le doigt indicateur de la main gauche sur le lieu qu’il va percer, de manière que l’ongle de ce doigt soit tourné vers le bas du ventre du malade; puis prenant de la main droite le trois-quarts, desorte que sa convexité regarde la poitrine, il le plonge au bas et au milieu de la ligne blanche, quarante millimètres au dessus du pubis.”

The *Parisian Surgical Journal*, by Mons. Desault, contains three cases wherein this mode of operating was successfully adopted by Mons. Noel, surgeon to the Hotel Dieu at Rheims.

bladder to draw it from off the can-
nula ; neither does that mode of ope-
rating offer a single advantage which
does not equally belong to the puncture
close upon the pubes. As to the trocar
being pushed in without any previous inci-
sion, this certainly would be the best plan,
if the bladder lay at the same depth in all
patients ; but in this respect there is a dif-
ference of three or four inches, some pa-
tients are so much fatter than others. The
obesity of some is such as to make it a
depth of three or four inches in fat before
we come to the pyramidales muscles ; if,
therefore, we do not carry on our incisions
far enough to enable us to place our finger
upon the pubes, we can have no criterion
whereby to judge of the distance into the
bladder. Perhaps, however, in very spare
subjects, it might be well to puncture
without cutting previously, but certainly
this ought never to be done under other
circumstances.

OF PUNCTURING THE BLADDER FROM
THE PERINÆUM.

THIS is an operation which, as before stated, I think should never be done, unless an unsuccessful attempt has been made to cut into the urethra behind a stricture. If a stricture in the urethra occasion the retention of urine, and there be reason to believe that an opening can be made into the canal behind the stricture, then most assuredly such an operation should be undertaken. The patient should be similarly placed as for the operation of lithotomy. A staff is to be passed along the urethra till it reaches the stricture, and it must be steadily held there by the hands of an assistant. The surgeon must feel for the end of the staff in the perinæum, and cut down upon it; the patient must then be desired to make a violent effort to expel his water, which will distend the

canal behind the stricture, and probably render it so obvious as to direct the surgeon how to extend his incision with certainty : but whether this be perceptible or not, it affords the best chance of hitting upon the posterior part of the urethra, and therefore ought on no account to be neglected. If the attempt succeed, an elastic gum catheter had better be introduced down the penis into the wound, and thence into the bladder, and it should be retained there till the wound in the perinæum is healed, the same as after making a new urethra ; and in this manner the patient may be cured of his stricture at the same time *.

Should it happen that the urethra behind the stricture is so small, that it cannot be found in the manner above described, the surgeon may then either cautiously extend his incision into the bladder, as is done in making a new urethra, and adopt the same after-treatment, or he may introduce a trocar from the wound into the bladder. If the latter be done, a

* See a case in the Author's Practical Essays on Strictures of the Urethra, &c., page 243.

finger should be passed into the rectum, which will enable the surgeon to avoid that bowel; but there will be little danger of injuring the rectum with the trocar, if it be carefully pushed forward in the axis of the bladder.

Should the patient have disease of the prostate, although we may suspect a stricture in the anterior part of the urethra to be the only cause of the retention, neither of these operations should be attempted; nor even simply to puncture the urethra behind the stricture, unless it happen that, when the patient makes a violent effort to expel his urine, the canal behind the stricture can be distinctly felt to swell; but if this can be perceived, then the urethra may be punctured behind the stricture, because there can be no doubt of success attending such an operation.

ON RETENTION OF URINE FROM MUCUS,
PUS, OR COAGULATED BLOOD
IN THE BLADDER.

Pus and mucus, when secreted by the bladder, so commonly escape with the urine, that we might suppose they would never prove an obstruction to its flow, and if the water were retained along with them, it might be attributed to the same cause which prevented the discharge of the mucus and pus. The urine is, however, much more fluid than either mucus or pus, and, consequently, either of the two latter might very possibly plug up an aperture through which the urine would otherwise escape. Of this we have frequent proof, by the catheter being so clogged with mucus, as to oblige us to remove it from the bladder on purpose to free it of the mucus before the remainder of the urine can be brought away. This has occurred to me many

times, and compelled me to use instruments with large openings to admit the tenacious mucus. Catheters employed for this purpose should always be of the very largest size that can be introduced upon the patient, and by this means I have hitherto always succeeded in emptying the bladder. It is, however, not at all unlikely for the mucus to be so thick occasionally, that it will not enter the catheter, there not being sufficient contractile power in the bladder to force it into the instrument ; under these circumstances a syringe should be attached to the external end of the catheter, by which means the mucus or pus may be drawn away ; and to shew the advantage of this, Sabatier writes, “ *ce procédé a été mis en usage avec le plus grand succès dans des cas qui paraissaient désespérés.*”

Blood may collect in the bladder, owing either to wounds of that viscus, or to the kidneys being injured by rough calculi within them, or by severe bruises on the loins. I have known it to happen in consequence of a boy being kicked on the

side. So long as the blood remains fluid, it comes away pretty readily along with the urine, but after it has coagulated it cannot pass ; and then, of course, may bring on retention of urine. Precisely the same treatment is applicable to get blood away as that recommended for the removal of pus or mucus from the bladder. If the large catheter and syringe had suggested itself to Mr. John Hunter, I have no doubt he would have tried it in the following case, which is related in his work on the Venereal Disease.

CASE.

“ I have known cases where the common catheter has been pushed through the projecting part of the gland into the bladder, and the water then drawn off ; but in one patient the blood from the wound passed into the bladder, and increased the quantity of matter in it. The use of the catheter was attempted a second time, but, not succeeding, I was sent for. I passed the catheter till it came to the stop, and then suspecting that this part of the pro-

state projected forwards, I introduced my finger into the anus, and found that gland very much enlarged. By depressing the handle of the catheter, which of course raised the point, it passed over the projection; but unfortunately the blood had coagulated in the bladder, which filled up the holes in the catheter, so that I was obliged to withdraw it and clear it repeatedly. This I practised several days; but suspecting that the coagulum must in the end kill, I proposed cutting him as for the stone; but he died before it could be conveniently done, and the dissection, after death, explained the case to be what I have now described."

Any cautions against pushing the catheter through the enlarged lobe of the prostate, to get away the urine, as sometimes has been practised, and even been recommended, would be quite superfluous after the recital of the above case.

ON RETENTION OF URINE CAUSED BY A STONE IN THE URETHRA.

THE nature of these cases is generally ascertained by the catheter's striking against the calculus ; but it sometimes happens, that violent spasm effects the urethra, and prevents the catheter being passed so far as to reach the calculus ; or the stone and the catheter may be prevented from meeting by an intervening stricture ; then of course, the real nature of the case can only be suspected in consequence of the patient having been subject to expel calculi, or from his having a short time previously had symptoms of a stone descending along one of the ureters.

The treatment requires to be a little varied, according to the situation of the

calculus and the nature of the obstruction to its farther progress along the canal. If it be not ascertained that a calculus lodges in the urethra, it is satisfactory to know that exactly the same treatment ought to be adopted, as would be proper in the same patient, if the retention resulted from some other cause; i. e., he must be treated agreeably to the existing symptoms—by cathartics, venesection, opiates, warm bathing, &c.

A stone that has entered the urethra may be stopped in its course, either by its great bulk in every diameter, or by lying with its longest axis across the urethra, or it may be owing to the temporary narrowing of the canal by spasm or inflammation occasioned by the irritation of the calculus, or by a permanent contraction at a stricture. If inflammation and spasm exist, they are to be subdued by means of purgatives, bleeding, anodynes, and warm bathing; and when those remedies have produced a sufficient effect, it frequently happens that the violent efforts to make

water drive out the stone, and the urine follows ; but if this do not take place, there are but two modes of obtaining relief, either by cutting out the calculus, or by pushing it back again.

It has indeed been recommended never to put back the stone into the bladder, lest it should increase there, and render the operation of lithotomy necessary.— This assuredly deserves some consideration ; nevertheless I think there are sometimes sufficient reasons to justify such a proceeding. First, it may be remarked, that calculi sometimes appear to have no disposition to attain a large bulk, and in proof of this being the case, it may be mentioned that a great number of small stones, all nearly of one size, have been met with in the same patient. Sir Astley Cooper relates a case of 142 small calculi being taken out of one bladder ; and, “ Monsieur Desault has even extracted 200 in an operation he performed on a curate of Pontoise*.” How did it happen that none of these attained a greater mag-

* Page 386 of *Parisian Journal*, by Mons. Desault.

nitude? Could it be merely the effect of their attrition, or may we suppose that when the calculi had attained a certain size, the calculous diathesis afterwards only operated to increase the number of them. It is very difficult to explain it in a manner that is perfectly satisfactory; but without having recourse to speculative theory, it is an undoubted fact, that calculi under certain circumstances do not attain above a certain magnitude, and further it happens to be when such circumstances exist that small calculi most frequently lodge in the urethra. If a calculus have once entered the urethra, it is not unlikely to do the same again, if it be pushed back into the bladder. And if the calculus be larger in one direction than another, it is possible for its longest axis to lie across, and for that to be the reason of its lodging in the canal; and in that case, pushing it back into the bladder would afford an opportunity to the calculus of entering the urethra in a direction more favourable for its passing through it. If, however, it should be too large to pass along the canal, then, if it be put back into the bladder, it would

most likely come to the same part of the urethra a second time, and afford an equal opportunity of being removed by art, as it did in the first instance. It is, however, not at all improbable, that the calculus may be stopped in its course by the urethra being irritable and more contracted than usual, which irritability can not be removed effectually so long as the calculus remains in the canal, or so long as the retention of urine continues; or lastly, the irritation and spasm of the urethra may be owing to some cause that would require more time for its removal than we can suffer to elapse, without emptying the bladder. These considerations would induce me, if the case became urgent, and the stone lay near to the neck of the bladder, to procure relief by pushing back the stone, because there would be so many chances of its coming away at a future time, or of its coming to the same place again, when it might be cut out; or, if neither of these happened, the operation of opening the bladder would not be much more formidable than cutting into the prostate gland to take the stone from

thence. Much of the foregoing reasoning was suggested by the following

CASE.

At seven o'clock in the morning I went to see a middle-aged fat gentleman, who laboured under retention, in consequence of a calculus lodging in the urethra. He had been frequently the subject of similar attacks, and at different times had voided a large number of calculi. Anodynes had generally been used till the stones were expelled. To ascertain if there was a calculus in the urethra, I tried gently to introduce a small silver catheter, but there was so much spasm, the instrument could not be made to enter the membranous part of the canal. He took *tincturæ opii* g^{tt.} xx, and went into the warm bath. Meanwhile an enema was prepared with *terebinth: commun: ʒj vitel: ovi: q: s: tinct: opii: g^{tt.} xx aquæ ferventis ʒ viij*; this was administered immediately after he came out of the bath, and about ten o'clock, (three hours after my first seeing him), another attempt was made with

the catheter; it passed through the membranous part of the urethra, and encountered a calculus very near to the neck of the bladder; the stone moved back before the instrument, and the urine was drawn off. The patient afterwards used the warm bath once or twice—took effervescing saline medicine with antim: tart: He also had some brisk cathartics, and was limited to milk and other mild food. Three days afterwards he voided a calculus of an oblong, triangular shape.

If, therefore, a calculus lodged in the prostatic part of the canal, and produced retention of urine, I would, in the first instance, try the effects of venesection, cathartics, anodynes, and warm-bathing, with a view of relieving spasm, and otherwise bringing the urethra into the best possible state to admit of dilatation; and while this was doing, it would afford time for more urine to be secreted, which, under a given quantity, would excite stronger efforts for its expulsion, and perhaps drive out the stone before it. But if these measures did not succeed, and the case grew desperate requiring immediate

relief, I would employ a large bougie, and push back the calculus into the bladder. If the stone came forward again, and lodged in the same part of the canal, or if it advanced further along it, then I think it should be cut out; or perhaps it might be possible to dilate the urethra before the calculus, to facilitate its expulsion. The means best adapted to this latter purpose, I imagine to be sponge dipped into melted bees'-wax, and moulded by pressure into the shape of a bougie, which form it would retain when cold. In this state it might be introduced along the canal till it arrived at the stone, and being allowed to remain there, the warmth of the passage would soften the wax, and allow the sponge to expand by its natural elasticity, and thus slowly and gently, but certainly, dilate the urethra. Perhaps some difficulty might occur in procuring one piece of sponge long enough; in that case two or three pieces of this kind of sponge tent might be placed endways in a small eel-skin, or chicken's bowel tied at one end, and afterwards turned inside out, for it to have all the external surface perfectly

smooth. The sponge would expand equally well within a sheath of this kind, and then there would be no difficulty in removing the whole from the urethra *.

When, however, the calculus lodges pretty far along the membranous part of the canal, and especially if it has advanced still further, it should not be pushed back again, but, if none of the foregoing expedients will bring it away, recourse must be had to an operation. If the stone lodge in a part of the urethra anterior to the scrotum, the operation for the removal of it is simple and easy ; we have

* I have to regret that Sir Astley Cooper's urethral forceps escaped my notice, till it became absolutely necessary for this essay to be delivered in at the college. They constitute a valuable addition to the resources of operative surgery. A particular account of these forceps, together with a very interesting case, wherein eighty-four small calculi were successfully extracted along the urethra, may be seen in the 2d part of the 11th volume of the *Medico Chirurgical Transactions*.

There is every reason to believe that, employing the sponge tent above-mentioned, to dilate the urethra throughout its whole length, previous to the introduction of the urethral forceps, would materially facilitate the operation, as well as give an opportunity of removing larger calculi, than could be done without such previous dilatation.

only to feel for the stone on the under side of the penis and cut down upon it, but in doing this we should take great care not to make a valvular opening, lest the urine be injected into the cellular membrane, and occasion sloughing. To avoid this the external part of the incision should be larger than that which opens into the urethra.

If the stone lodge in any other part of the canal, the patient should be secured as is done for the operation of cutting into the bladder, and the incision must be made in the perinæum. In that case a staff had also better be passed into the urethra, as it may prove a very useful guide. Should the stone rest in any part of the urethra that is covered by the scrotum, it will be right to introduce a large bougie, and push the calculus back into the perinæum before operating, as it would be wrong to wound the scrotum.

A calculus lodged behind a stricture cannot be cut out too soon, as no other

means have any chance of success. In Mr. Hunter's work on the venereal disease, there is an engraving of a small stone lodged behind a stricture, which obstructed the flow of the urine, and proved fatal.

ON RETENTION ATTENDED WITH
EFFUSION OF URINE INTO THE
CELLULAR MEMBRANE.

ALTHOUGH retention of urine unrelieved by art does for the most part destroy the patient, yet it occasionally happens that the efforts of nature are able to form a new outlet for the water, and then life is preserved. Where a stricture in the urethra constitutes the impediment to the flow of the urine, it is no uncommon thing for the urethra to ulcerate behind the stricture, and then urine is effused into the cellular membrane of the perinæum, suppuration takes place in consequence of the irritation of the urine, the abscess bursts externally, and by this means an opening is made through which the urine escapes, and thus life is prolonged at the expense of a urinary fistula. This, however, is comparatively a rare occurrence,

for, when once the urine has begun to be injected into the cellular membrane, it usually goes on to insinuate itself throughout its substance in all directions, passing from the perinæum to the scrotum, prepuce, groins, abdomen, and thighs ; and, wherever it spreads generally producing a slough, often to such an extent as to prove fatal. The effusion of urine is frequently preceded by ulceration in the bladder near to its neck ; and in one instance I have known it to happen in the prostate gland, and all the urine that got into the cellular membrane first passed through the prostate. Sometimes the urine is extravasated whilst means are being employed to empty the bladder, but this most commonly arises from neglect in not sending for the surgeon soon enough to give him an opportunity of preventing it. Sometimes it takes place in consequence of the urethra ulcerating, without there being any impediment to the flow of the urine.

Urine in the cellular membrane is mostly first discovered at that part where the scrotum joins the perinæum, for, although

the effusion may have begun much farther back, it seldom produces swelling enough to attract notice, or any discoloration of the skin, before it has advanced sufficiently forward to get beyond the fascia of the perinæum, which terminates at the root of the scrotum.

If the patient has* smarting in the perinæum at every attempt to urinate, and this smarting seems to increase at every subsequent attempt; and if upon examination there is found tumor and discoloration in the perinæum, then we may be sure that urine is being extravasated into the cellular membrane.

The treatment of these cases consists in making a free incision into the tumified parts, in order to give free vent to the pus and urine, and thus to prevent further mischief taking place. This end will be the more perfectly attained in proportion as the incision can be carried near to the point at which the effusion commences; but, if there be retention of urine, and after laying open the swelling the urine

gush out, and the bladder be readily emptied through the opening which has been made, we may then rest satisfied with the operation. On the contrary, if the urine do not escape freely, the surgeon should introduce a catheter, and if it encounter a stricture, then, guided by the instrument, the incision should be carried if possible a little beyond its point ; but, if there be no stricture, the patient should be made to void all his urine through a catheter passed into the bladder, and retained there, by which further extravasation will be prevented.

Should the urine have been very extensively diffused into the cellular membrane of the scrotum, prepuce, groins, abdomen, &c., then, beside laying open the perinæum, as already described, it will be necessary to scarify the other parts, and to press the urine out of them as much as possible. Inflammation is sure to arise wherever the urine is effused, and this inflammation mostly terminates in mortification : when, therefore, incisions are made to favour the exit of the urine, and every

possible precaution is taken to prevent further effusion, the rest of the treatment must be such as may seem to be best calculated to prevent or arrest sloughing. Fomentations and poultices must be applied locally, and the utmost attention should be paid to cleanliness. The constitutional treatment must be regulated by the state of the general health, without having any particular reference to the state of the parts.

Mortification from constitutional causes will always be attended with great debility of the whole system, and in such cases the strength of the patient must be supported by every possible means. Such is almost certain to be the state of the patient if the urine have been effused in consequence of ulceration occurring without any previous retention, or any stricture existing in the urethra. Let it, however, be remembered, that retention of urine often happens in the most vigorous and healthy persons. Under these circumstances, if urine be effused into the cellular membrane and produce mortification, there

will be no deficiency of power in the system, and then the constitutional treatment may consist in nothing more than preserving the patient as comfortable as possible, to prevent the local affection from producing general disturbance ; for, if there be neither prostration of strength nor real deficiency of power, it is always wrong to stimulate the constitution with a view to stop mortification, the effect of a local cause ; but when the mortification has been arrested by appropriate means, and the dead parts are beginning to separate, then stimulating the whole system proves useful by accelerating the process, and the only rule to be observed in the exhibition of cordials is to give them more or less freely in proportion as the constitution is in a debilitated or tolerably vigorous state.

Mortification occurring in consequence of urine being injected into the cellular membrane of strong healthy patients, may, however, be so extensive and affect the whole system so much, as to produce great prostration of strength, if not real debility long

before separation begins, nay, even before the bounds of the mortification are defined, and then the constitutional treatment must be just the same as though the whole system had been previously in a bad state; so that the constitutional treatment must always be suited to the existing state of the general health.

The ensuing case is another instance serving to shew how much the functions of the brain are sometimes influenced by the state of the urinary organs, and it also points out the propriety of inquiring into the state of the bladder, in patients who may appear to be suffering under apoplexy.

CASE.

A fat old gentleman who had almost ruined his constitution by excessive eating and drinking, was heard making a strange noise early one Saturday morning. His servant went into the chamber and found him struggling on the floor, nearly insensible. A physician and surgeon were

sent for, and they declared the patient to be in a fit of apoplexy. He was bled, took hydrarg: submur: with some other active cathartics, and saline draughts every four hours. The patient came to himself a little, and while he remained sensible, inquiry was made as to the cause of his being on the floor, and he informed the attendants that he got out of bed to make water, and supposed that he must have fallen down, but nothing more could be learnt from him before he again went into a kind of stupor. Late on the following day, Sunday, I met the surgeon coming from the patient. He told me of the case, and said that he had just then discovered that the scrotum was swollen and nearly sphacelated. I suggested that urine might be effused into the cellular membrane of the perinæum and scrotum. He then took me to see the patient, and I immediately perceived that my suspicions were correct. A catheter was brought to me; it passed without difficulty, and emptied the bladder of some very high-coloured urine, containing a dark-brown sediment

very like coffee grounds. At this time the patient was in a dying state, and consequently no operation could be of any service. He died about six hours after I left him. Permission could not be obtained to examine the body.

ON SUPPURATION AND ULCERATION OF THE BLADDER.

IN the general observations on cystitis, it was said, that inflammation in the urinary bladder produced similar effects, and had similar terminations to what it had in other parts. It was also mentioned that the lining of the bladder being a mucous membrane, pus might be secreted from it without any very evident alteration in the appearance of it except its being more vascular; and one case was related to shew that suppuration occurring in the mucous membrane of the bladder, was sometimes attended with a very high degree of vascularity equal to that which is seen at the external orifice of the urethra during the most violent stage of gonorrhœa. It was not, however, then noticed that suppuration sometimes takes place in the substance of the bladder, i. e., between its coats. Hoffman relates an instance of a very large abscess forming in the fundus of

the bladder, which broke and discharged into the cavity of the abdomen, and he speaks of abscesses in the bladder discharging from the perinæum. This latter circumstance is also noticed by the author of the article *Inflammatio Vesicæ* in the London Medical Dictionary, but there is so little said by these authors on the subject, that I am rather inclined to suspect those abscesses which discharged through the perinæum had been formed in the prostate gland.

Abscesses in the coats of the bladder I imagine to be sometimes produced in the same manner as some of those small abscesses which frequently occur in the course of the urethra during a gonorrhœa, and to admit of the following explanation: The inflammation of the mucous lining is relieved to a given distance from the surface by the secretion of pus or mucus, but if the inflammation extend deeper, then it proceeds as in a common boil, setting up the adhesive stage first, which is followed by the suppurative and the consequent formation of abscess.

When abscesses which have thus formed in the coats of the bladder break and discharge into its cavity, there can be no doubt of their laying the foundation for ulceration of that viscus. I believe, however, that ulceration of the bladder more frequently arises from abscesses forming in other parts and extending to the bladder, or from the irritation of a calculus within its cavity; or else from fungous growths shooting from the prostate into the bladder and ulcerating upon their surfaces; or, lastly, from some specific disease of a neighbouring part falling into a state of ulceration, and extending into the bladder.

Since writing the above, I have had an opportunity of examining a body which contained a very fine specimen of ulcerated bladder, the effect of stricture in the urethra. The muscular coat was very much thickened and fasciculated, and extensive ulceration existed in the membranous lining, which in other parts was exceedingly thickened. I understand the man to have been 57 years of age, and to have suffered in his urinary organs as long as he could remember, even when a child.

ON THE SYMPTOMS OF SUPPURATION IN THE BLADDER.

THE symptoms of suppuration in the bladder are pain and irritation in that viscus; frequent desire to part with the urine, with pain and difficulty in voiding it; but the difficulty of emptying the bladder depends upon some circumstances which are not always present, and consequently that symptom is not an invariable attendant; and besides these, pus comes away in the urine. Having mentioned the discriminating marks between pus and mucus, when speaking of irritable bladder with mucous discharge from it, I shall in this place only point out how we are to know whether the pus in the urine be formed by the bladder, or by the kidneys, or by the prostate gland, because when either of these organs secrete pus, it usually appears in the urine. In deciding this,

we shall often obtain the most assistance from considering the history of the case. If the foregoing symptoms exist without any others, and if they have succeeded to cystitis or retention of urine, (which latter I believe to be the most frequent cause of suppuration in the bladder,) then we may have little or no doubt of its being vesical pus ; but, if there have been symptoms of disease in the kidneys, such as heat, pain and tenderness in the loins, and, if these symptoms still exist, then there will be some reason to think the pus may have come from the kidneys. But, as it is very common for the bladder and kidneys to be diseased at the same time, especially when the patient has long suffered from stone in the bladder, then it is possible the pus may be formed both in the bladder and kidneys.

If, however, there be no symptoms of disease in the kidneys, but those which have been mentioned as indicative of disease in the bladder, and there be super-added, a sense of heat, dull pain, and fulness in the perinæum, and perhaps an

oozing of pus from the urethra as in gonorrhœa, then there will be no doubt of the prostate forming pus, although there may be no question of pus being also secreted by the bladder.

ON THE TREATMENT OF SUPPURATION OF THE BLADDER.

ONE principle circumstance in the treatment of vesical suppuration, is to take care that the bladder empties itself completely ; and if this be not effected by the natural efforts, the catheter must be used once or twice daily, or oftener, if by that means the patient can be rendered more comfortable ; besides this, there must be great attention to cleanliness ; and it may be well to employ the hip bath every evening. The constitutional treatment must be regulated according to what may be the variation from the standard of health. If there be strong pulse, and other symptoms of violent arterial action, with no want of power in the system, then the patient should live abstemiously upon plain mild food, such as is light and easy of digestion, of which

milk, if it agrees, should constitute a great part. Anodyne medicines should be given with cooling saline mixture, or what is sometimes preferable, small doses of oleum ricini formed into an emulsion with muc : gum : acaciæ.

It more generally, happens, however, that suppuration of the bladder comes on after the violence of the inflammation has abated, and when the natural powers of the system are below the healthy standard ; and in that case a mild, but generous, diet should be allowed. It seldom answers to give wine, or any kind of fermented liquors in these complaints ; therefore if they are thought necessary, their effects should be closely watched, to give an opportunity of suspending them immediately they are seen to prove injurious ; and for the same reason, when tonic medicines are required, aqueous infusions or decoctions of bark, gentian, or columbo are mostly preferable to spiritous tinctures. As an astringent and tonic remedy, the uva ursi may be found useful.

Unless the irritation of the bladder, which is productive of suppuration, can be removed, the patient will become hectic, and die tabid. In the fourth case of retention of urine mentioned in the late Mr. Hey's surgery, he having described how he succeeded in getting the urine away, concludes by saying—"The life of my patient was preserved at this time; and the catheter was suffered to remain in the bladder. After some weeks an inflammatory affection ensued, which brought on a discharge of purulent matter; and the patient died hectic, in about six months after my visit." The eighth case was more successfully treated. "White matter, of a purulent appearance, flowed from the bladder with the last portion of urine. As his nights were not passed comfortably, and as the painful desire to make water returned sometimes early in the morning, I gave him for several nights, at bed-time, a bolus with calomel gr v, and opium gr i, which procured comfortable rest, and seemed to hasten on the power of expelling his urine. The purulent appearance of the last portion

of urine ceased gradually, after I had begun to extract his urine twice a-day ; and at the expiration of sixteen days, he needed no longer the assistance of the catheter."

ON THE SYMPTOMS OF ULCERATION IN THE BLADDER.

THE symptoms of ulceration in the bladder may be said to be the same as those which denote suppuration without ulceration, only as an ulceration of the bladder is a more advanced stage of the disease, we may expect the symptoms to be more violent in degree. The principle of ulceration is irritation with weakness ; hence, when the bladder is ulcerated, the patient's feelings are generally more susceptible of impressions, and the system being weak, is less able to resist them, consequently the sufferings are more severe than when suppuration is unaccompanied by ulceration. Another cause of increased pain we may suppose would result from the urine having access to the ulcerated surface ; but as we cannot know how great a degree of suffer-

ing may attend suppuration alone, the severity of the symptoms will not enable us to speak with confidence as to the existence of ulceration. A much better criterion I believe to be the colour of the pus; if it has a dirty red appearance, rather seeming to have a red colour of its own, than to have blood mixed with it, I am disposed to believe that a discharge of this kind will not occur without ulceration being present; but ulceration often exists without any such discharge, which must, therefore, be considered to indicate a particular kind, or state, of ulceration, rather than as constituting a general symptom of it. When ulceration has extended from the bladder so as to form a communication with the canalis uteri, or rectum, or abdomen, it will remove all doubt; but it is wonderful to know how great a degree of ulceration may exist without this happening. It is mentioned in Dr. Baillie's *Morbid Anatomy*, that the whole of the inner membrane of the bladder is sometimes destroyed by ulceration, and the fibres of the muscular coat laid as bare as if they were nicely dissected. And in a case

in which this took place most completely, the bladder was almost filled with scrophulous pus. I scarcely need to remark, therefore, that, if a curdly white matter be discharged with pus from the bladder, it will of course seem to indicate that particular kind of ulceration which has been just described.

ON THE TREATMENT OF ULCERATION OF THE BLADDER.

THE local treatment of ulceration of the bladder consists chiefly in removing all possible causes of irritation; thus, if the pus and urine be imperfectly discharged by the natural efforts, their complete evacuation must be ensured by the introduction of the catheter as often as may appear to afford relief, as once, twice, or thrice a day, or oftener. Opium suppositories are frequently known to procure great mitigation of the pain. Warm olive oil injected into the bladder has been found to lessen painful spasms of that viscus, and from reasoning upon the subject, I should imagine it likely to be of equal, if not greater, service, in diminishing the pain from ulceration of the bladder. The contents of that viscus being drawn off by the ca-

theter, some warm olive oil should afterwards be slowly injected through the instrument. I have said slowly injected, because there is some reason to believe, that if the bladder be hastily distended, though it be with the mildest fluid, it may irritate.

Warm olive oil, injected into the urethra, has already been mentioned as being used in Italy to relieve spasm in cases of retention of urine, which would lead us to expect that it has a soothing effect upon the urinary passages in general; but independent of that, if thrown into the bladder after the urine has been taken away, I think it promises to be useful upon the surface of the ulcer, by shielding it from the future urine. There is one circumstance connected with the state of the urine, that of rendering it as little irritating as possible, which depends wholly upon the constitutional treatment. The state of the urine can only be influenced by the state of the whole system, or of the digestive organs. And I may say here once, and for all, that it is a mistaken idea to think of rendering

the urine less irritating by increasing the quantity of it by means of diluent drinks. No urine disturbs the bladder so little as that which is most healthy and natural ; and if the drinking copiously of some mere diluent would increase the quantity of the urine, and thereby cause it to contain less of the natural salts ; the good effects of this, if any, would be more than counterbalanced by the irritation that must be excited by the kidneys being called upon to secrete more urine than ordinary, and by the bladder having to dilate and contract so much more frequently. The proper quantity of any kind of drink, therefore, will be that which most favours the digestive function ; for whether the stomach be rendered uncomfortable by too much or too little fluid being taken, it will be sure to aggravate the existing disease in the bladder.

As regards diet and medicine, it may be remarked of both, they must be such as are best adapted to improve the general health, that is, mild, nutritious food, and such tonic medicines as have already been recommended for suppuration of the blad-

der without ulceration. For, as the health of each individual part of the body depends upon the health of all the rest, attending to improve the state of the whole system, is the most likely way to remedy such local affections as are out of the reach of topical remedies. The bowels must be preserved moderately open; and if aperients be necessary for this purpose, those which are of the mildest description, such as manna oleum ricini, magnesia, &c., are always to be preferred. Balsam of Peru is strongly recommended by Dr. Marryatt; but as I have never used it myself, I can give no opinion on the subject.

CASE.

W. E., a poor man, between seventy and eighty years of age, sent for me on Tuesday, September 13th, on account of having retention of urine. He informed me that, during the previous four years, he had always had more or less difficulty in making water, and sometimes he had had strangury. An itching round the anus

had troubled him a good deal, and he had suffered considerable pain in the hypogastric region, on the pubes, in the perinæum, and still more acute pain at the extremity of the penis. All his symptoms had been increasing during the last seven days, and had been unusually violent for twenty-four hours before my seeing him. His urine had come away by drops only, and very little had escaped during the last week, there was now a complete retention which had lasted a day and a night, attended with the most urgent desire and violent straining. A most distressing pain always attacked the end of the penis after voiding urine.

There was no perceptible fulness in the hypogastrium, neither could I feel that the bladder was distended. Some difficulty occurred in passing the catheter, but it entered and brought away a pint of turbid, dark urine, which was followed by some whitish pus or mucus, and that again was succeeded by a quantity of pus of a dirty red colour. He told me that he seldom had regular stools, for the straining to

expel his urine generally forced away fæces. The pulse was sharp, and the tongue covered with a thick, yellow fur. I ascertained that the prostate gland was diseased, and am of opinion that a fungous growth had shot forth into the bladder from the gland, and that the fungus was in a state of ulceration. I recommended him to leave off spirituous liquors; to have milk morning and evening instead of tea; to drink milk and water whenever he was thirsty, and to have boiled meat at dinner; and he was directed to use fomentations to the perinæum and over the pubes frequently. He took pulv: ipecac: com: gr: x c̄ sodæ vitriolat: ʒij. as soon as it could be procured, and the neutral salt was to be repeated in four hours.

The next morning (September 14th,) the poor fellow expressed himself as being very thankful for what had been done, and said that he had not slept so many hours together as he had done the last night for many months previously, and that he was comparatively free from pain. He had voided a pint of turbid,

dark urine by the natural efforts in the course of the night, and experienced much less pain than usual afterwards. The catheter brought away a pint of the same kind of pus and urine as that already described. His tongue continued furred, and having had no stool, he was desired to take half an ounce of oleum ricini, and repeat it in four hours if it did not operate before the expiration of that time. In the evening the catheter brought away about the same quantity of pus and urine as it did in the morning. Oleum ricini had not operated.

Sept. 15.—The castor-oil operated three times early in the morning. He had passed another good night. Urine and pus much the same. He now began to take effervescing saline draughts with tinctura opii et vin: antim: three or four times a day. The catheter was used night and morning, and in all other respects the same plan of treatment was continued, with the exception of his taking one or two pills of hydrargyri submurias \bar{c} opio, on account of his fæces having no appearance of bile in them. In about a fortnight

he was very much better in all respects, only his appetite had fallen off, to improve which he took pulv: cinchonæ ʒij
 c̄ pulv: zinziberis gr. x ter die. The pus that came away now was all white, and his urine had a whey-like appearance and a purulent smell. The introduction of the catheter was so much easier, that he was taught to pass it himself without the stilet, and thus by employing it every four hours, it kept him, as he told me, (to use his own words) “as easy as an old glove,” and rid him of griping pains in the hypogastrium, which pain I doubt not arose from the bladder. He commonly took a few grains of pulv: ipecac: comp: at bed-time, and relieved the bowels when necessary, by means of oleum ricini. Once, that the bowels were very much confined, an injection of one ounce of salt in five half-pints of gruel, was administered; it operated well, and he passed a most comfortable night afterwards. Soon after his being allowed to use the catheter every four hours, no pus was discharged from the bladder, and the urine lost the purulent smell; and if he passed the instrument re-

gularly every four, or five, or six hours, the urine remained free from pus ; but if he neglected to employ it for twenty-four hours together, some pus always began to shew itself, but invariably disappeared again on the catheter's being passed frequently. In the following January the patient was so extremely comfortable, that he told me his own opinion was, that he should very shortly be quite well. The last time I saw him was about twelve or thirteen months after my first attendance, and then he said, that by using the catheter every six hours, he could always keep his urine clear, and himself free from pain.

ON SCIRRHUS AND CANCER OF THE BLADDER.

THE rectum, the uterus, and the prostate gland are all liable to be the seat of scirrhus and cancer, and it sometimes happens that this disease extends from these parts to the bladder, but I am not aware that cancer has ever been known to affect the bladder without having commenced in some of the contiguous parts. To the best of my recollection Morgagni relates only one case of the bladder being in a scirrhus state, and in that instance there can be no question of the disease having begun in the uterus. Dr. Baillie remarks in his *Morbid Anatomy*: “ I do not think that it (i. e., the bladder,) is often *singly* affected by it. The disease on some occasions spreads to the bladder from the rectum, and on others from the uterus: *under such circumstances* the bladder becomes very

thick and hard, and exhibits the ordinary cancerous structure." From this it will be observed, that the author speaks very cautiously as to its ever commencing in the bladder, and only describes the morbid appearances it produces in that organ, when it has originated in another part.

ON THE SYMPTOMS OF SCIRRHOUS OR CANCEROUS BLADDER.

THE symptoms of cancer in the bladder will be somewhat modified by the part which is affected, and the extent of the disease. There is irritation and consequently frequent desire to pass urine, but if a large portion of the bladder be diseased, it will be so rigid as to contract with difficulty to expel the urine; and, if a cancerous fungus have projected from the prostate gland, it may, by falling against the orifice of the urethra, afford as great an impediment to the urine, as is caused by the enlarged posterior lobe of the prostate.

If the cancer have formed a communication with the rectum or uterus, then the urine will partly escape through them. There seems to have been no symptom no-

ticed as peculiar to cancer of the bladder. Judging from the next case that will be related, I should be inclined to suspect its existence, if the patient complained of gnawing pains about the hips and thighs, or occasionally made bloody urine; and if, when no blood came away, there was observed, a pale mucus, about the consistence and colour of sweet oil, with apparently a brown powder mixed with it. This patient's urine sometimes had a peculiar smell when it contained the above-mentioned mucous discharge, but I cannot determine whether this smell arose from the urine or from the mucus.

ON THE TREATMENT OF SCIRRHOUS OR CANCEROUS BLADDER.

IN the treatment of scirrhus bladder, the surgeon must direct his attention to allay local and constitutional irritation by every possible means, for there is in truth no permanent cure to be obtained in this dreadful disease. Local warm bathing should be recommended. All the narcotic medicines may in their turn prove useful ; indeed this disease is sometimes attended with such violent pain as to render opiates indispensable ; but in the following case it will be seen that no remedies appeared to afford such decided relief as the potassæ nitras, bals : copaibæ, and the terebinth : vulg. The oleum ricini was useful in keeping the bowels regular, and sometimes a few grains of hydrargyri submurias c̄ opio seemed to mitigate the pain. The rest of the system never can be free from

irritation if the digestive organs be disordered, therefore the diet ought to be moderate in quantity, and such as is light and easy of digestion, and properly nutritious.

CASE.

An old gentleman, 70 years of age, consulted me for a complaint in his urinary organs, which had troubled him for some years. He had received a variety of opinions from different practitioners, but in spite of all that could be done his disease increased upon him. His symptoms were soreness along the urethra, difficulty in passing his urine, and occasional retention of it, which could only be relieved with the catheter. He generally made a small quantity of urine every ten minutes during the day, and several times in the course of the night. Very often he could void no water at first, but after sitting still a short time, it would then flow as well as usual. Exercise always increased the soreness of the urethra, and occasioned bloody urine. The urine which was shewn to me

was pale and had a peculiar odour, and when poured away carefully, there remained behind a sort of mucus in colour and consistence very like almond oil ; it seemed to have a little dark-brown powder mixed with it, and adhered to the bottom of the vessel. At this period he was not inconvenienced by any severe pain. His appetite was tolerably good ; his tongue was furred, and he was often obliged to take aperients to keep his bowels regular. He led a very sedentary studious life. A surgeon of eminence had sounded him but could find no stone, and he further informed me, that, whenever any instrument was passed into the bladder he suffered dreadful pain, until the last time when a friend of mine had employed an exceedingly small catheter, and this being used without a stilet, had entered without either pain or difficulty.

I advised him to be particular in his diet, eating only such things as were light and easy of digestion. To avoid every description of fermented liquor. To bathe himself about the perinæum once or twice a day, and to keep his bowels regular by

means of small doses of *oleum ricini* when needful. I told him my opinion was that he could not empty his bladder, and at his own request I passed a small catheter and found six ounces of urine. This was on the 16th of June, 1815. I saw him again on the 19th: he had made water with greater difficulty than before, which made me think a larger instrument would be preferable, and I introduced a silver catheter, knowing that a metallic instrument sometimes creates less irritation than one of elastic gum. It passed very readily, and gave no pain at all. Six ounces of urine came away, and was slightly tinged with dark-coloured blood.

June 21.—Only four ounces of urine was found in the bladder, and that was, as before, slightly tinged with blood.

June 23.—A considerable quantity of blood had been noticed in his urine on the evening of the 22d, and it had continued to appear ever since in each portion of urine that had been passed. The blood was very dark-coloured, and seemed to be

nothing but the red globules which retained their shape, and subsided to the bottom of the vessel on being allowed to rest. This bloody appearance could not have been occasioned by the catheter, otherwise it would have shewn itself in less than twenty-four hours after the instrument was used; I therefore suspected it was discharged from some diseased surface. He objected to having the catheter used again for some time.

I recommended him to take an effervescing saline mixture, with *tinctura opii* and *vinum antimoniale*.

The effervescing mixture procured him better rest of a night, but although he continued to take it eight or nine days, it did not lessen the quantity of blood in the urine. He then tried a mixture of *lac amygdal* : \bar{c} *soda exsic* :, but after taking of it three days he was no better, and the quantity of blood discharged was not sensibly diminished. A patient having some time before consulted me on account of hemorrhage from the urethra, for which he

could assign no cause, I ordered him to take small doses of balsam : copaibæ, and it stopped the bleeding immediately. This induced me to try the same remedy in the present case. He took bals : copaibæ gtt. x carbon : sodæ gr. iij tinct : opii gtt. iv every four hours, and it afforded him considerable relief ; it caused a copious secretion of urine which contained no blood, and was voided with great facility. By abstaining from wine and all kinds of fermented liquors, confining himself to mild nutritious food principally milk, and occasionally taking of the bals : copaibæ emulsion ; his general health improved very much, his tongue became clean, and he gained flesh considerably. His urine was free from either mucus or blood, and appeared in all respects healthy.

In this comfortable state he continued till the latter end of October, when he began to experience a degree of strangury, which he imputed to his having taken cold. This irritation caused him to rise in the night, and thereby exposed him to more cold, and increased the strangury till

he sent for me on the 4th of November, to relieve him of a complete retention of urine. I saw him at nine o'clock in the evening, and without any difficulty passed a small catheter, and drew off two pints of urine followed by a little bloody pus, after which he felt quite easy. There was a good deal of soreness in the urethra, but he felt no pain a few minutes after removing the instrument. There appeared to be no disorder about this patient, but the disease at the neck of the bladder. Ever since my attending him in the summer he had preserved his bowels regular, by means of a tea-spoonful of *oleum ricini* taken every other day. His tongue was clear, appetite good, and he slept well. He was directed to use fomentations frequently, and take of an emulsion which contained *oleum ricini*, *vinum antimonii*, et *tinctura opii*.

Nov. 5, A. M., 9 o'clock. He had remained easy, and slept till two o'clock in the morning, and then having a desire to urine he made an ineffectual attempt, and from this time the inclination to empty the bladder continued to increase, and had been

extremely severe for about two hours previous to my seeing him. I drew away two pints of urine, and it was accompanied with rather more dark-coloured blood and mucus. He now took hydrargri \bar{c} creta gr. viij \bar{c} pulv : antim : gr. iij., and this was followed by magnes : sulph : $\bar{3}$ vj divided into three doses, one to be taken every two hours. I visited him again in six hours, and found him no better. The catheter passed without the smallest difficulty, and brought away a similar quantity of urine to that in the morning, but there was more blood and mucus. By eleven o'clock at night his bowels had been freely acted upon, but he had a most urgent desire to make water. I now employed nearly a full sized catheter ; it passed very readily, and brought away two pints of urine which was almost the colour of dark blood, but the red globules retained their shape.

Nov. 6, seven o'clock A. M.—A quantity of blood and urine similar to the last mentioned came away. He made many ineffectual attempts to pass urine during the

night. The catheter was used again at three o'clock p. m., and brought away only three half pints of urine, but there seemed to be rather more blood than in the morning. He took sodæ carb. ʒj. tinct. opii gtt. vj ē vin : antim : gtt. vj quarta quaque hora.

Eleven o'clock at night. I found him much more comfortable in all respects, and he had voided about three ounces of bloody urine by the natural efforts. The small catheter was now employed, just to see if it would make any difference in the quantity of blood discharged ; there was only half a pint of urine to come away, and it was accompanied with very little blood and mucus.

Nov. 7, eight o'clock a. m.—He had passed a more comfortable night than he had done for some time, and he had made nearly half a pint of bloody urine. The small catheter was again used and brought away six ounces of urine, and but little blood and pus. His bowels were confined.

The anodyne mixture was continued, but he took in addition to that, *magnesiæ vitriolatæ* ʒj ex haust : *aquæ*.

Eleven o'clock, P. M.—The cathartic had operated copiously three times. He had been tolerably easy all day, and had passed half a pint of urine. About nine in the evening he began to feel a strong desire to make water, which rather seemed to increase till the catheter was introduced, but there were only five ounces to come away, and but little blood and mucus.

Nov. 8.—He had passed a good night and voided half a pint of urine, the catheter found only four ounces in the bladder. The blood which appeared in the urine looked very like coffee grounds.

Ten o'clock, P. M.—He had passed twelve ounces of urine during the day, and it contained abundance of the dark-brown blood. About eight o'clock in the evening he experienced considerable irritation and desire to urinate, but the catheter

found only four ounces to come away, and that was bloody.

Nov. 9.—He told me he made water more freely than he had done for nearly two years, and less frequently. The catheter drew away four ounces of clear urine. It was now very evident that the size of the catheter made no difference in the quantity of blood discharged, for, although this seemed to lessen just at the time of resorting to the smallest catheter, and less blood usually came through the instrument while it continued to be employed, yet once or twice a large quantity of blood appeared in the urine which was voided by the natural efforts.

The same plan of treatment was persevered in, and he continued to improve. Nov. 13. He informed me that he had passed a most comfortable night, and only got up once to make water, that he had again made water upon rising, and that the two quantities measured about a pint. The catheter passed without giving him any pain, and only found three ounces of clear urine.

I now taught him to introduce the instrument for himself, without the stilet, and told him to use it every time he felt a desire to void his urine. At first he found it necessary to use it about every two hours, but in a few days he could hold his water six hours at a time. There was no occasion for me to see the patient again till he sent for me on the 27th of March the following year ; he then told me that blood had come away with his urine about ten days. I introduced the catheter, and it was so clogged with mucus and blood, as obliged me to withdraw it several times before all the urine could be taken away. The mucus was exceedingly tenacious, and preserved the worm-like form that it acquired by being forced through the instrument; and the blood was so intimately mixed with it, that its red globules could not be separated from the mucus by washing. I subsequently discovered, that by regulating the point of the catheter, the blood might be got away either before or after the urine. There was no particular pain, nor any thing else to complain of but the bloody discharge, and, as a mixture with the bals:

copaibæ had once before been successful in relieving a similar discharge, I advised him to take small doses of that medicine in combination with a little tinctura opii.

March 29th.—I found him much the same. I used a large catheter, and it brought away the same kind of bloody mucus as last mentioned, but the size of the instrument allowed it to flow with more ease, and I had no occasion to withdraw the catheter before the bladder was emptied.

March 31st.—Less mucus appeared, and that was less tenacious. Some of the colouring matter of the blood was extremely dark, and was separated from the mucus; but, although floating loose among the urine, the red globules retained their shape. He took a dose of uva ursi three times a day.

April 2d.—Since taking the uva ursi, the secretion of urine had been unusually copious, and perfectly colourless. Little or no bloody mucus appeared in the urine;

which might possibly be owing to the large catheter having at last taken away from the bladder all that had been some time accumulating. There was so much irritation produced by the *uva ursi*, acting as an astringent, that it could not have been continued longer, even although it had been the means of checking the mucous discharge. He took effervescing saline draughts during the day, and *pulv: doveri* at bed-time.

April 3d & 4th.—Better each day, but the bowels constipated. I ordered him to take *magnes: sulp: ʒij ex lacte amygdal: ʒij secundis horis*.

April 5th.—The cathartic mixture having been all taken without producing any effect, he was directed to have *olei ricini ʒss*, and it operated twice copiously. For some time previous to this, he had been incapable of voiding any urine without the catheter, but he now began to make a little in the natural way. About half a pint of urine, which had been drawn off at twice, was shewn to me; it had a

healthy odour, and contained about $\bar{3}$ ss of extremely thick, glary mucus, which had mixed with it a great deal of earthy matter, which felt gritty, and looked like particles of old mortar. The mucus had no smell different from the urine, neither was there any appearance of blood. The mucus did not readily attach itself to any thing, but when it had once fixed itself, it could with difficulty be separated, and the end of a stick entangled in it would lift nearly the whole quantity. He took a saline mixture with tinct: opii, vinum antimonii et tinctura digitalis.

April 6th.—He made less urine, and it was bloody; in all other respects he thought himself improving.

April 8th.—The urine still appeared a little bloody, but there was less mucous discharge. The anodyne in the mixture appeared to have a constipating effect, for double the usual quantity of oleum ricini, would not procure evacuations. The tinctura opii in the mixture was changed for ext: hyosciami gr: viij. From this time

he regularly improved in health to all appearance till the month of August, when he went to spend a short time with a friend at a distance. Soon after he returned home, he began to complain of gnawing pains in his hips and thighs, which were thought to be rheumatic, because change of weather greatly affected him; but my private opinion was, that they were occasioned by the disease in the neck of the bladder. He found considerable relief from taking, every night at bed-time, pulv: ipecac: com: gr. x \bar{c} hydrarg: subm: gr. iss. In the spring of the year of 1817, he continued much the same as regards the state of his bladder, but the sciatica was more distressing. As the calomel and dovers powder could not be taken for more than a certain time, without exciting ptyalism, it was, after a while, changed for an enema, with tinctura opii gtt. xxx, and muc: gum: acaciæ, and when this was omitted, on account of its constipating effects, he had an injection of plain warm water every day, which he said afforded him great comfort, but he afterwards thought the injections debilitated him, and for that

reason determined to do without them. I had for some months previously, frequently found him feverish, with furred tongue, and full, rapid pulse, which, about this time, I discovered to arise from over-eating. Saline medicines and less food always proved serviceable. Milk agreed with him very well, and he took little other sustenance.

Before this period I could not prevail upon him to use the hip-bath, but he having procured one, and going into it every night, was greatly relieved of the pains in his hips and thighs. Another grievance then arose ; if he did not happen to fall asleep immediately after getting into bed, a most distressing pain in the urethra came on in about half an hour, and continued so long as he remained in bed, but if he got out and sat up in a chair for some time, the pain left him. This pain was accompanied with a violent desire to make water, but he did not obtain ease so soon by taking away his urine, as he did by waiting the usual time.

In the month of June, he was feverish, with furred tongue; had scanty secretion of urine; great swelling of the lower extremities, and was incapable of lying down to sleep. The pain in his hip always distressed him to a violent degree in any position except that of sitting up in a chair, which relieved him materially. He imagined himself to have taken cold in using the hip-bath, and he told me it no longer mitigated his pain. I advised him to take some draughts, with *nitras potassæ et vinum antimonii*, and the relief he experienced by them was perfectly wonderful. He obtained good rest when lying down; his tongue became clean; the pain in the hip nearly left him; the irritation in the urinary organs ceased, and the bowels acted regularly without any other means being employed. He became able to walk about from room to room, went up and down stairs, and rode in a wheeled chair round the garden, none of which things he had done for nearly twelve months before.

In August he thought he took cold by riding in the garden: many of the dis-

tressing symptoms returned, more especially the pain in the hip, which symptom came on to a most excruciating degree; he could get no sleep, and was obliged to remove his urine frequently in the night, and a longer catheter than formerly was necessary to reach the water. He was recommended to use an injection composed of terebinth: vulg: et tinct: opii, with about five ounces of water, and the very great relief afforded by this remedy exceeded all that he had ever experienced from any other. He had not an unpleasant symptom that was not lessened by it, and some were altogether removed. It always procured him seven or eight hours' sleep, and prevented any inclination to part with his urine during the night.

September. — He was tormented with pain in his hips when he lay in bed; and if he sat up in a chair, it produced cramp in all the posterior muscles of the thighs; and when this compelled him to go to bed again, it was a long time before the cramp went off; indeed he never appeared to be easy, excepting whilst having his

lower limbs rubbed by the attendants, or after having the anodyne enema last mentioned, which he was afraid of using too frequently on account of it constipating the bowels. He lost flesh and became very thin. Lying upon either side produced such agony in the hips, that he could not bear it; hence, whether he sat up or lay down, there was constant pressure made upon the lower part of the sacrum and os coccygis, which occasioned the integuments covering them to inflame and ulcerate. I represented the necessity of avoiding pressure on those parts, and every possible contrivance was resorted to by way of preventing it. A ring cushion stuffed with wool was first tried, but he could not be induced to use it more than two or three days before he was tired of it. A similar kind of cushion, filled with straw, pleased him more, and at first he quite exulted in the comfort it afforded him, but ultimately threw even that aside. Pillows were then placed under him, both when he sat up or lay down, and by great attention to defend the sacrum from pressure, we succeeded in healing the ulcer, and the inflammation

disappeared. The bladder continued in much the same state as described in the preceding month, otherwise I thought him rather improving.

October.—He was very feeble, quite incapable of moving his legs forward in going from his bed to his chair, so that the attendants pushed them forward one at a time, while some supported him by the arms: he either could not bear to be carried, or would not suffer it. The integuments covering the sacrum inflamed and ulcerated again. He complained of much irritation in the urethra, and suffered dreadfully from pain in the hips and legs; and it was necessary to have somebody rubbing the latter almost constantly. The anodyne injections did not always relieve him from pain, nor procure refreshing sleep; but sometimes, when he did not rest in the night, he slept the following day.

November.—He continued to lose flesh; he suffered an increase of pain, and drew off his urine more frequently. The ulcera-

tion and inflammation over the sacrum greatly extended, and a slough formed in the centre. Every possible contrivance was employed to lessen the pressure upon these parts, but without the desired effect; the most successful plan was cutting away a portion of the mattress over which the nates lay. On the 29th of this month he became unable to pass the catheter into the bladder, and would have sent for me, but that he knew I was gone to a considerable distance to see another patient, and could not be home again before the next day. The gentleman who usually attended the family made several unsuccessful attempts to introduce the catheter during twenty hours, and only succeeded a few minutes before I arrived. The great irritation, which was occasioned by not having the urine removed sooner, affected him extremely, indeed he never completely recovered it. From this time the catheter was retained in the bladder, and only withdrawn to be cleaned and replaced by myself every second or third day. Mr. — paid very great attention, and saw the patient two or three times daily, and I gene-

rally met him there once a-day, but, in spite of all our endeavours to prevent it, the inflammation, ulceration, and sloughing increased over the sacrum, and the lower limbs were in such incessant pain, as obliged him to have them rubbed almost constantly.

With a view to relieve the lower part of the back from pressure, the patient leaned forward in his chair, and supported the weight of his head and trunk as much as possible, by placing his arms on a pillow lying before him on a board, the two ends of which rested on two tables. In this position he obtained more ease and sleep, but after a few days inflammation and sloughing took place opposite to the tuberosities of the ischium, and then, though still miserably uncomfortable, he found most ease in bed. The bowels were disposed to constipation, to obviate which either cathartic injections or *oleum ricini* became needful; and, unless this was carefully guarded against, all his sufferings were greatly aggravated. The anodyne enemata were also used occasionally to mitigate

pain. Any stimulating food or drink increased the irritation at the neck of the bladder. In this state he remained till the 13th of December, when he had three such violent rigors, each of about half an hour's duration, that it was thought he would have expired ; these were succeeded by some degree of heat and profuse perspirations. On the 15th a spontaneous purging came on, which could with difficulty be moderated, and to control it perfectly was impossible. Fæces passed involuntarily, and so often that it was impossible to keep him clean ; indeed he could not bear the fatigue of being lifted in bed for that purpose so frequently as could be wished. As the secretion of urine continued, and there was no symptom which indicated suppuration of any of the urinary organs, I gave it as my opinion, that the violent rigors were produced by suppuration taking place in some part which had great connexion with the brain ; and that as ulceration and sloughing had exposed the sacrum, which looked black and dead, this might probably have caused suppuration within the sub-

stance of that bone, or immediately in contact with it in the pelvis, in the same way as injuries of the scalp often occasion pus to form between the cranium and dura mater.

Saturday, Dec. 20.—I found the patient nearly exhausted : he had had two or three slight shiverings in the night, and the pulse was small, feeble, and very frequent. In the evening I was obliged to visit a patient sixteen miles off, and did not get back till the next morning, when I was requested to see my old friend immediately, for that the catheter had been drawn out by accident, and Mr. — had been trying all night to replace it, but could not succeed. I went and found the patient expressing an urgent desire to empty his bladder ; I passed a catheter, but there was no urine to come away. Three hours afterwards he died.

I was permitted to examine the body, but was so limited to time, as prevented my making so minute an inspection of it as I wished to have done. On first exposing the bladder its external surface ap-

peared healthy, but on cutting into it much disease was seen. An irregular mass of hard fungus projected from the neck of the bladder, and perfectly surrounded the internal orifice of the urethra ; and so completely did this excrescence obscure that passage, that I could only discover the entrance to it from the bladder, by passing a catheter all the way along the canal from the penis, and the instrument entered the bladder as near as may be through the centre of this cauliflower-shaped fungus. I cut out the whole of this fungus, and a portion of the prostate gland, to obtain an opportunity of examining its structure. Almost the whole of the fungus consisted of hard white bands, which crossed each other in all directions, and between these bands there were enlarged veins filled with dark blood. In a word, it was most decidedly cancerous. There were two other small fungi growing from the fundus of the bladder, but these were of a very different nature to that above described, being pulpy and easily pressed between my thumb and finger. All the rest of the bladder looked healthy, but it contained about two

drachms of pus, and there was pus in the pelvis of each kidney, and the left kidney had a cyst upon its convex edge, which seemed filled with yellow serum. A large collection of pus was found between the rectum and sacrum.

From this examination it is obvious that this patient's urine never could have been wholly expelled without the catheter, and some of it always remaining in the bladder, must have proved a constant source of great irritation; he would consequently have suffered more severely, and could not have lived so long, had not the urine been so frequently drawn off. It is impossible for any case to point out more clearly than is done by the preceding, how much advantage may result from regularly emptying the bladder by means of the catheter.

The blood which so often appeared in the urine, came, I should imagine, from the ulcerated surface of the fungus.

OF INCONTINENCE OF URINE.

THE muscles of the urethra, and the sphincter vesicæ, are the antagonists of the detrusores urinæ ; hence, during a state of health, as one of these powers relaxes, the other contracts, and so the urine is expelled or retained by the reciprocal action of these two sets of muscles. Having already noticed retention of urine, as the effect of disproportionate action in the muscles of the urethra and sphincter vesicæ, I now have to consider the opposite kind of complaint, viz., an inability to retain the urine. This proceeds from a variety of causes : First, ulcers of the bladder that form communications with the rectum or perinæum in men, or with the uterus or vagina in women. Secondly, paralysis of the muscles of the urethra, and of the sphincter vesicæ. Thirdly, irritability of the bladder, and too great a disposition in its anta-

gonist muscles to relax when the urine excites a disposition to expel it : and, Fourthly, contraction of the bladder, which renders it incapable of dilating to receive the urine.

ON THE SYMPTOMS OF INCONTINENCE OF URINE.

THE symptoms of incontinence of urine may be said to be all expressed in the name given to the complaint when the urine is voided through the urethra; because it mostly happens that the patient experiences no other inconvenience than what results from his being incapable of holding his urine at pleasure, it therefore runs from him involuntarily. When this arises from paralysis of the sphincter vesicæ and of the muscles of the urethra, the urine escapes from the bladder as fast as it enters that viscus from the ureters; but when it is the effect of irritability of the bladder, and corresponding readiness to relax in the antagonist muscles, it often happens that the patient can retain his urine pretty well during the day, because the action of the

sphincter being partly involuntary and partly voluntary, its power can be increased by the will, but when that voluntary power ceases during sleep, then the urine flows away. Incontinence of urine, the effect of ulceration or sloughing which has formed a communication with the rectum or uterus, may be distinguished by the urine passing down the *canalis uteri*, or through the anus. In these latter cases the water is sometimes constantly draining away, or else it is expelled every few minutes, which is equally troublesome.

There is, however, one caution necessary to be observed, in order to prevent actual retention of urine from being mistaken for incontinence. As already mentioned, if the whole bladder happens to be paralytic, the quantity of urine which it can retain will depend upon the space there may be within the abdomen ; so that when the bladder can enlarge no more, owing to the pressure of the surrounding viscera, then the urine keeps constantly dribbling away, and deceives the patient very commonly into an idea that he cannot retain his urine. When-

ever, therefore, a patient has incontinence of urine, and the water runs off along the urethra, the surgeon should not fail to examine if there be any tumour in the hypogastrium, and, if there be, let him introduce the catheter to ascertain whether or not there be a retention of urine. Two cases of this kind have been mentioned, one in speaking of retention of urine, and the other when treating on the subject of irritable bladder, with mucous discharge from it.

Incontinence of urine from morbid contraction of the bladder, may be known by feeling the bladder from the rectum, and by the urgency of the symptoms which will shortly come on if a jugum penis be applied ; but there will most likely be other symptoms of disease in that organ.

ON THE TREATMENT OF INCONTINENCE OF URINE.

I HAVE an indistinct recollection of having attended two children for incontinence of urine, in one of whom it resulted from teething, and in the other from some disorder in the bowels, which was cured by purging; but I cannot remember sufficiently to enable me to particularize more of these cases. This, however, is very certain, that disorder of the bowels does sometimes produce retention of urine by lessening the sensibility of the bladder, and thus causing a kind of temporary paralysis of the detrusor urinæ muscle; and that being indisputable, it must be allowed that, if the same kind of disorder in the bowels were to act upon the sphincter instead of the corpus vesicæ, it would be followed by an incontinence of

urine ; therefore, when ever children appear to be incapable of retaining their urine properly, the state of the bowels should have some attention.

Incontinence of urine, owing to want of power in the sphincter vesicæ and muscles of the urethra, is best treated by means of cantharides. This remedy is known to have a specific effect upon these muscles, causing them to act violently to the production of strangury, therefore, by regulating this effect, the lost power in the sphincter may very often be restored. The effect of the lytta upon the neck of the bladder, is brought on with nearly equal certainty, whether it be taken internally or applied to raise a blister on some part of the external surface ; therefore it may be left to the discretion of the practitioner to decide on the preferable mode. If a blister be used, I think it had better be applied upon the sacrum, and it should not be removed till some degree of strangury has been experienced ; or, if it be taken away sooner, the cuticle which has been raised being removed, the surface of the sore should be

sprinkled over with pulv: lyttæ twice a-day, till it occasion strangury, after which the surface may be washed to free it from the cantharides, and then be dressed with simple cerate.

CASE.

An old gentleman had been troubled some time with an incontinence of urine, which appeared to result from deficiency of power in the sphincter vesicæ. He had a large blister applied over the sacrum, and after it had lain on twenty-four hours, the lower edge was raised, and the cuticle was punctured to let out the serum, and then the plaster was laid down again. Between the second and third day a degree of strangury having come on, the blister was removed, and when the painful effects had subsided, he retained a comfortable power of holding his urine.

In administering this medicine internally, a great deal more care is required than in using it externally ; for I have known very

small doses produce great distress and bloody urine. The proper dose seems to be six drops of tinctura lyttæ, taken three times a-day, till it causes some degree of strangury, and then it should be suspended. Mr. Hunter relates a case where he ordered *fifteen* or *twenty* drops to be taken once, or twice, or thrice a-day, and he acknowledges that it distressed the patient more than was necessary.

CASE.

A journeyman whitesmith, about sixty years of age, was my patient on account of several complaints, and, among others, he had incontinence of urine, which seemed to arise from want of power in the sphincter vesicæ and muscles of the urethra. I ordered him to take small doses of the lytta twice a-day. On the third day he began to find an irritation at the neck of the bladder, and on the fourth day he had so much strangury that I desired him to leave off the medicine, and when the strangury went away he could hold his urine properly.

The effects of the lytta in this case were allowed to abate without the use of any means to diminish them, but in Mr. Hunter's patient he found it necessary to relieve the man by injecting an aqueous solution of opium along the urethra.

Incontinence of urine proceeding from too great sensibility of the bladder, and too great a disposition to relax in the sphincter, would receive benefit one might suppose from the use of any means that would lessen the irritability of the corpus vesicæ. Towards the latter part of the cure of one of those instances of irritable bladder from disorder of the bowels, which I have adduced, it will be remembered that the patient still complained of frequency of making water, which I thought depended upon habit. The bladder having been accustomed to empty itself more frequently than usual, had, I conceived, become incapable of holding so much as nature intended it should, without inconvenience. I told the man to make an effort to retain his urine longer, and by degrees he acquired the power of doing it for the proper time. This, I have no doubt,

was the principle which effected the cure in the following case, which is related by a Mr. Hyslop, in the sixth volume of the *Medico-Chirurgical Transactions*, but that gentleman does not make the slightest observation by way of explaining what he conceives to have been the precise nature of the case.

CASE.

“The patient was a young gentleman of thirteen years of age, who had been subject to incontinence of urine for nine years, during which time he never passed a single day, without several involuntary discharges of his urine, and even during the night the same unfortunate and involuntary evacuation constantly took place. In consequence of this his life became truly uncomfortable. He had to submit to pain from inflammation coming on in the neighbouring parts, and from consequent excoriations; and he suffered much from the disagreeable urinary effluvia which constantly passed by evaporation from his clothes and from his bed.

“I selected a bougie of a size large enough

to fill his urethra, from which I cut about two and a half, or three inches. Having placed that on the outside of the underpart of the penis on a line parallel to the canal, with its point projecting a short way beyond the glans to avoid as much as possible any pain from pressure, I passed straps of adhesive plaster around, (first at the point of the penis and afterwards continuing strap after strap the length of the piece of bougie,) and pulled them so tight as to press the bougie close in upon the urethra, so that no space was left by which the urine could pass.

“ This was done at ten o'clock at night, and at three o'clock he called me out of bed, having a great desire to pass urine. I removed the straps, &c. and when he had emptied his bladder, I applied others in the same manner. The next desire for this evacuation was about seven o'clock, and the next again at eleven o'clock in the forenoon. After each evacuation the pressure was renewed without any unpleasant symptoms, and in three days he was cured of incontinence of urine.”

I have introduced this case as being an

instance in which too much sensibility in the corpus vesicæ was cured by obliging the bladder to bear a greater stimulus, whereby its unnatural sensibility was removed. It appears to me, however, that the urine being thus forcibly retained, excites also the contractile power of the sphincter, for, though a certain stimulus during health brings on contraction of the detrusores urinæ muscles, and simultaneous relaxation of the sphincter, yet it is well known, that if the stimulus be long continued, it has an opposite effect upon the sphincter, causing spasm and retention of urine, which is no longer voluntary. A somewhat less degree of contractile power in the sphincter vesicæ than would be sufficient to produce involuntary retention of urine is often the only thing wanted to cure an incontinence of it, and I conceive this exact degree of contraction may be imparted to the sphincter, simply by keeping the urine in the bladder till it becomes a sufficiently painful stimulus.

Incontinence of urine, the effect of unnatural communications between the bladder

and vagina or rectum, has very generally been considered irremediable. When it arises from cancerous ulcerations there certainly is no cure for it, but these cases are most frequently met with in females, and are the consequence of some injury done to the parts during labour, and then they sometimes do admit of relief; but as most of the practical observations which I have to make on these complaints will be found in the ensuing case, I will relate it without any further preface.

CASE.

“ A young woman*, after a labour of some days’ continuance, was delivered by the perforator and crotchet of her first child, which had been dead apparently about two days. During the labour she gradually lost the use and nearly the feeling of the lower extremities, accompanied by very severe spasms and pain in the hips.

* Vide Medico-Chirurgical Transactions, Vol. 6, a paper on Incontinence of Urine. By Mr. Barns, of Exeter.

“ In the early part the urine was passed frequently ; towards the end it was gradually forced off during a pain, but no considerable quantity was at any time collected in the bladder. After delivery the urine was discharged involuntarily, and she was scarcely sensible of the passage of the fæces, though she had the perfect power of retaining them. The numbness of the extremities and the spasms still continued. The parts about the perinæum were considerably swelled, and a very fœtid and dark-coloured discharge, in which were occasionally observed small portions of membranous sloughs followed the delivery, and lasted for about a week. During the fifth and sixth days she had the power of retaining the urine for more than three hours ; but when it passed, it scarcely allowed her time to move from her position in bed for the purpose. From the seventh day she lost all power of retaining it.

“ When I saw this patient at the end of three weeks from her delivery, the urine was constantly flowing when in bed. She

retained it but for a short time when sitting up, and under the latter circumstances she was utterly unconscious of its coming until she felt wetted by its presence. She had been gradually recovering from the numbness of the extremities, though unable to walk without help; and had recovered a perfect sense of the passage of the fæces.

“ The retaining the urine at will not returning with the increasing sensibility and strength of other parts; and the knowledge of the circumstances attending her labour, rendered it probable that some communication had been formed between the bladder and vagina. And on introducing a catheter through the urethra and a finger into the vagina, an opening was immediately discovered just about the neck of the bladder which exposed the instrument for more than an inch in length, and through which the point of the finger could be passed into the bladder. The edges of the aperture were irregular, soft, and yielding, the touching them caused no pain, nor did any blood make its appearance on withdrawing the finger. The swelling of the

parts about the entrance of the vagina had subsided quickly under the use of a decoction of camomile flowers, which had also been regularly thrown into the vagina, whilst any unhealthy discharge proceeded from it.

“ A flat silver catheter was left in the bladder, and a few days after an elastic gum bottle was introduced into the vagina. A firm one was selected, capable of containing two ounces of water, and had sewed on the convexity of its side a thin fine piece of sponge as large as a dollar. A double string was passed internally through its bottom, and left hanging through its neck. The sponge was well smeared with the calamine cerate, the bottle dipped in oil, folded longitudinally, and passed into the vagina with the sponge in front. From its elasticity it immediately expanded, and by a finger introduced through the neck it was readily placed in its proper situation, so as to bring the sponge immediately opposite the perforation in the bladder. The catheter was then withdrawn.

“ In this situation it filled the vagina, and

kept up a gentle and equable pressure on the injured part, so equable and so effectual that whilst the bottle was in the vagina the urine was perfectly retained for a little more than two hours. If the bladder was not then emptied by the catheter the urine continued to ooze away until it was drawn off. Guided by this the catheter was introduced every two hours during the day. This was preferred to keeping the instrument constantly in the bladder, as she found much inconvenience from its remaining there when sitting, and without further mechanical aid it was not possible to keep it steadily in its situation when walking.

“ It was not thought that the opening would be stretched by the inconsiderable dilatation of the bladder from the urine collected during the course of two hours, as she drank but very little in quantity, and the water drawn off seldom exceeded two ounces, generally did not amount to so much. Provided no urine passed through the opening the principal object appeared to be attained, and the patient

was enabled at the same time to get out of doors. When in bed a short flat catheter was kept constantly in the bladder. The bottle was withdrawn, and *a fresh one* introduced every morning before she left her bed.

“ The comfort afforded by this plan in keeping her dry during the day was exceedingly great. She was enabled to move, sit or lie without inconvenience nor was she ever wetted unless the bottle was become soft from use. This, when discovered was carefully guarded against by renewing it frequently. In a short time she learned to pass the catheter herself, and felt happy in being thus relieved from much of her anxiety and dependence.

“ At the end of a month the opening was found to be very perceptibly lessened. At the end of two, it was not more than large enough to admit the catheter to pass into the vagina. In the course of the fourth month she found occasionally that the bottle did not answer in keeping her per-

fectly dry as it had hitherto done. The perforation at this time was so much contracted as not to allow of the catheter being felt through it, but some degree of vacancy at the spot was still perceptible. A few weeks afterwards on another examination, the depression was still existing at the injured part, and the catheter could be distinguished there more sensibly than either above or below the spot. The investigation was made with much caution and gentleness, and the result was such as to evidence a belief, that the aperture had closed. The same means were continued however for a fortnight longer, after which the bottle was left off by day, as it was found she remained perfectly dry without it. The catheter however was still introduced every two hours whilst up, and at night the bottle and catheter were employed as at first, it being thought most prudent still to keep up a moderate pressure, and to prevent any distention of the bladder, or even that natural action of it which would be required if the urine were expelled without the aid of the catheter.

“ After a short period the time of drawing off the water was gradually lengthened, until it was retained six hours. The use of the catheter was still continued some weeks longer, though the bottle had been for some time left off. At the end of about nine months she resumed her natural habits in every respect as well as before her labour.

“ In this instance the loss of substance, from sloughing or ulceration, was considerable ; as great, probably, as commonly occurs in cases of this nature ; and the opening may be considered as being closed at the end of a little more than five months from the receipt of the injury.”

Success in the treatment of these cases appears to depend, in some measure, upon the early application of suitable means. The elastic bottle and sponge should, therefore, always be employed, as soon as ever the state of the parts will admit of its being worn. There seems reason to doubt the possibility of effecting a cure after the opening has become fistulous, but

there is every probability that patients in that state may be rendered much more comfortable by the use of the elastic bottle and sponge than they would be without it. The size of the bottle must be adapted to the space it has to occupy ; and as the power of expanding laterally will be materially weakened by the portion that is cut out, the bottles selected for this purpose should on that account have more substance than would be necessary for them to possess if they were to be employed whole. The sponge should be of a fine, soft, close texture.

OF STONE IN THE BLADDER.

CALCULUS in the bladder may produce, directly or indirectly, all the various symptoms which occur in almost any of the diseases which are peculiar to the urinary and genital organs, and consequently other diseases may be, and not unfrequently are mistaken for, stone in the bladder. There is but one infallible criterion by which we can ascertain the existence of this complaint, and that is, by introducing a metallic instrument down the urethra, and actually feeling the calculus. Independently, however, of this operation of sounding, the usual symptoms are, a frequent inclination to part with the urine, which is increased by exercise; pain and difficulty in voiding it; the urine sometimes flowing in a free, full stream, and at other times in a very contracted or twisted

one ; sometimes when the water is coming away in a full stream, it stops suddenly, and that before the bladder is emptied ; then, after a few minutes, the patient having changed his position, the remainder can be expelled, which seems to be owing to the stone falling against the internal orifice of the urethra ; for stone patients often discover that they can void their urine best when they rest upon their hands and knees, as this makes the fundus of the bladder the lowest part, and causes the stone to fall away from the urethra.

The pain which most distresses stone patients is generally felt in the glans penis, or within about half an inch, or an inch, of the extremity. It is frequently described as a burning pain, and patients sometimes find relief from pressing the end of the penis, or by pulling forward the prepuce. Children in particular may often be observed to do this, so that patients with stone frequently have a long penis and large foreskin. The greatest pain is usually experienced after making water, when the highly sensible bladder comes to

contract closely upon the hard rough surface of the calculus. Pain is also felt in the hypogastrium; sometimes also in the loins and abdomen. Pain, numbness, or a sense of coldness, often occurs upon the insides of the thighs and knees; and when the irritation in the bladder is very great, it sometimes excites vomiting. Other symptoms are, a sense of weight, and soreness in the perinæum, and about the anus. Tenesmus is a very common symptom of stone in the bladder, and the violent straining which sometimes accompanies the expulsion of the urine, aggravated by the fallacious sensation of wanting to pass fæces, occasionally produces prolapsus ani.

Some patients can feel the stone roll about, and sometimes it can be felt by the finger in the rectum. Bloody urine is sometimes voided after taking much exercise; mucus sometimes comes away in large quantities with the urine, and sometimes there is a discharge of pus, rendering the urine quite turbid. Very frequently, when the urine appears tolerably clear,

small flakes of mucus may, upon close inspection, be seen floating about, and specks of blood may sometimes be seen in it.

The instrument proper to be used in the operation of sounding, already alluded to, should be made of finely polished steel, and be of nearly the same shape as that recommended for a silver catheter, only it may be rather less crooked. The sound, as it is termed, should be introduced agreeably to those directions which have been given for passing the catheter, only as it is less curved, the surgeon will most probably find it necessary to depress the handle more. The most favourable time for sounding is in general while the bladder contains some urine, because then, by the patient changing his position, the stone may sometimes be brought into contact with the sound, whereas it might lie out of the way of the instrument, and be incapable of moving, if the bladder were empty and contracted upon it. The best position for the patient to be placed in during this examination is, midway, between sitting

perfectly upright, and lying down ; this makes the posterior part of the bladder the lowest, and brings the stone into the most convenient situation to meet the sound. The stone cannot, however, always be felt while the patient is confined in this situation, therefore if we do not succeed in finding the stone in one way, another position should be tried. Sometimes it can be the soonest detected if the patient stands upon his feet, as this causes the calculus to roll towards the internal orifice of the urethra. In other cases, the best mode of finding the stone is, to pass a silver catheter upon the patient standing, and draw off his urine ; the contraction of the bladder then brings the calculus to the sound. If the symptoms be such as to justify an opinion that a stone exists in the bladder when in reality none can be found, it may be right to repeat the operation of sounding two or three times before giving a decided opinion that there is no calculus.

Various things may occur to prevent the sound coming into contact with the stone, but I am inclined to think that when the

operation is properly conducted the most frequent obstacle is a morbid enlargement of the posterior lobe of the prostate gland, and perhaps a fungous growth from it projecting into the bladder. This almost certainly directs the sound against the anterior surface of the bladder, or towards one side; it exceedingly confines the motion of the instrument, and often prevents the possibility of making it touch the posterior surface of the bladder. Under these circumstances it might be right for the patient to lie on his side whilst being sounded, or for him to turn on his face, and then to raise himself slowly up, high enough to have the sound passed; this last plan might perhaps bring the stone to the front of the bladder, and leave it there in reach of the sound. Sir Everard Home, however, says that under circumstances of the prostate being enlarged, he finds the flexible gum catheter the best instrument to detect a stone in the bladder.

Calculus in the bladder, generally speaking, may be said to be one of the most painful diseases that affect the human body; there are, however, some rare in-

stances upon record of stones of a large size being found in the bladder after death, which had produced no sensible inconvenience, nor any symptom to excite a suspicion of their existence.

The Museum of the Royal College of Surgeons, London, contains a large calculus which was taken out of the bladder of a soldier who was not known to have experienced any symptom indicative of its presence. Another instance of the same kind is mentioned by Morgagni, B. iii. L. xlii. A. 19, and he notices several more similar cases upon the authority of other anatomists. Sabatier in his *Work de la Médecine Opératoire* also relates a curious case of an ecclesiastic who being distressed with symptoms of stone, was sounded by a surgeon and pronounced to have a calculus. Some time afterwards he lost every symptom of the disease, and therefore believed the surgeon must have been mistaken. He bequeathed his body to the practitioner that he might derive some instruction from the examination. The surgeon accepted the legacy, and upon opening the body in the

presence of many persons, a large stone was found in the bladder. The relief experienced in these cases must have been owing either to the sensibility of the bladder being lessened, or else to the surface of the stone having grown smoother, which rendered it less capable of irritating. It is observable that the surface of that calculus which was taken from the soldier is remarkably smooth, but neither Morgagni nor Sabatier take any notice of the nature of the stones in those cases which they have mentioned. Sometimes it happens that patients are freed from the symptoms of stone by the bladder contracting so forcibly about the calculus as to push it between some of the fasciculi of its muscular fibres, which closing again after the stone has gone past them, for ever afterwards prevent its falling back into the bladder, or being anywise troublesome. When this takes place the calculus carries a portion of the membranous lining of the bladder before it, which fits the stone so closely as to prevent it from moving, and forms a sac for the calculus in the same manner as the peritonæum is protruded

before the intestine, and makes the herniary sac. A remarkable instance of this has been related by Dr. William Hunter, and is to the following effect :

CASE.

A man was sounded and found to have stone in the bladder ; he took Mrs. Stevens's solvent for a time, and being freed from all the symptoms of stone, he was again sounded and was then declared to have no calculus in his bladder, upon which evidence Parliament voted Mrs. Stevens 5,000*l.* for divulging the secret of her medicine. When the man died who had been the subject of this experiment, his body was examined and a stone was found lying exterior to the muscular coat of the bladder, encysted in a portion of the membranous lining as above described.

Urinary calculi are found to differ from each other very greatly as to the substances of which they are composed, some are all phosphate of lime, others contain lithic acid, oxalate of lime, carbonate of

lime, urate of ammonia, ammoniaco-magnesian phosphate, cystic oxide, xanthic oxide, and fibrine. But the difference in the composition of the calculus seems to make no difference in the symptoms, only so far as it may influence the surface of the stone, rendering it more or less rough. Oxalate of lime commonly forms a very rough stone, usually called the mulberry calculus; hence a stone of this kind is more liable to produce violent symptoms, but smooth stones often occasion equal distress, therefore the most urgent symptoms unaccompanied with mucous discharge, cannot be considered as indicating any particular kind of calculus. Neither will the violence of the symptoms point out the probable size of the stone, for small calculi often create as much distress as large ones. When there happens to be but one calculus, it is most frequently found to be round or oval, and often to have flat sides. So far as I have yet been able to observe, there is the least difficulty in passing the urine when the stone is of a round, or oval shape, and flat.

ON THE THEORY OF STONE FORMING
IN THE BLADDER.

CALCULUS in the bladder, has, I believe, always hitherto been thought to be formed from the urine. I am, however, of opinion that it very often is formed out of the secretions of the bladder.

CASE.

Having a patient in such a state as rendered it necessary to retain the catheter in his bladder; it became necessary to remove it after five days, on account of the imperfect manner in which the urine was discharged through it. The end was then discovered to be incrustated with calculous matter, which had very nearly closed the opening into the instrument, and this had

caused the obstruction to the flow of the urine. When this instrument was first introduced, there was a mucous discharge accompanying the urine, but this had nearly ceased when the catheter was removed from the bladder. Another instrument was passed, and retained in the bladder about three weeks, in the course of which time it was taken out about every third day, to see if any calculus had formed upon it; but none had collected during the whole of that period, and I remarked that little or no mucus came away after the introduction of the second catheter.

CASE.

About twelve months afterwards, I had a patient with retention of urine, and found so much difficulty in passing the catheter, that I judged it right to keep the instrument in the bladder for a few days. On the third day afterwards I withdrew the catheter, to examine if calculous matter was collecting upon it, and found none. The instrument was again introduced, and

allowed to remain four days longer, and then it became necessary to take it out and clean it, as the urine was discharged very imperfectly. Retaining the instrument in this patient, after the second introduction of it, produced irritation and a copious secretion of mucus, which came away with difficulty during the last two days, and I imagined this alone had impeded the escape of the urine ; but, on attempting to remove the catheter, a considerable quantity of white calculous matter, on the point of the instrument, rendered it difficult to be withdrawn, and occasioned a good deal of pain to the patient. The incrustation had formed both within and without, and some portion of that on the outside appeared to have been broken off by the attempt made to draw it through the urethra.

Reflecting upon these two cases, it became evident that mucus was concerned in the formation of calculus, because no incrustation took place when no unusual or unnatural quantity of mucus was secreted. It then occurred to me that calculi often form in the mucus of the prostate gland, and a great number of authorities might

be cited, who allow that the mucus of the bladder enters a good deal into the composition of vesical calculi, and, as they suppose, serves to cement together the stony particles which have been collected from the urine ; and they seem to be of opinion that the stone increases most rapidly when there is a copious discharge of mucus. Another circumstance which rather favours my opinion, that vesical calculi are actually formed from the secretion of the bladder, is, that children and young people are much more subject to stone in the bladder than old people ; and, on the contrary, old people are the most subject to renal calculi, which are never met with in children. Now, if stone is formed from the urine only, the aged and the young ought to be equally liable to both renal and vesical calculi.

It is an acknowledged fact that patients having the posterior lobe of the prostate gland so much enlarged as to prevent the complete evacuation of the urine, are very subject to vesical calculi. This has been particularly remarked by Morgagni and Sir Everard Home, and I am

acquainted with a gentleman* who punctured the bladder above the pubes in two instances, and the disease in the urethra was such as induced the patients to keep an instrument in the bladder, and void the urine through it for the remainder of their lives. Both these patients had stone formed in the bladder. The surgeon talking with me one day on the subject, said, that the only objection which he knew to puncturing the bladder above the pubes was, that, in consequence of the whole of the urine not being voided, he found the patients were very liable to have stone. I asked him how he explained it, and he candidly told me he could not account for it satisfactorily, but he was sure that it did happen. Morgagni and Sir Everard Home both think that it proceeds from the dregs of the urine (if that expression be allowed) not being discharged; the earthy particles of which fall to the lowest part of the bladder, and at last the retained portion of urine containing more earthy particles than it can suspend, these aggregate into one or more masses †.

* Mr. George Langstaff.

† The 11th volume of the *Medico-Chirurgical Transactions* contains a paper by Sir Astley Cooper, in which he ex-

It is remarkable, that although it has been repeatedly noticed as a fact, that patients who have enlarged prostate are particularly liable to stone, it has never been suggested that the stones form out of the mucus secreted by the bladder. But I am convinced this is the case, and that this is the only reason why patients with diseased prostate are on that account more subject to stone; for it is notorious that, if the urine be not completely voided, it irritates the bladder, and causes the vesical mucus to be secreted in greater quantities.

Under some circumstances the mucus of the bladder does not visibly contain any earthy matter; but we are not

presses the same opinion as Morgagni and Sir Everard Home, as to these calculi being formed from the urine. This will be seen by the following extract.—“ When a great number of calculi are formed in the bladder, as was the case in the Rev. Mr. Bullen, the circumstance is generally attended with an enlargement of the prostate gland, and it depends upon a sacculus being formed in the bladder directly behind the enlarged gland. In these cases the bladder is rarely completely emptied of its contents, and the *calculi crystallize from the urine retained in this sac.*” I have already mentioned that this interesting paper escaped my notice till very lately.

to conclude that it contains none. At other times the earthy matter prevails in such quantities, as to make the mucus perfectly white, and sometimes it imparts to it a yellowish white colour so much like pus, that the eye cannot discriminate whether it be pus or mucus. When the bladder suffers a still greater degree of irritation, the quantity of earthy matter is so great, and the particles so large they can be felt by the finger; two instances of which have been related in a former part of this essay, and in one of these cases it will be recollected that I mentioned having picked out two large pieces, one of which was nearly of the size of a grain of wheat. I think, therefore, that it cannot be questioned by any impartial mind, that the vesical calculus is often formed entirely out of the secretions of the bladder.

There is every ground for believing that many persons never would have stone, if some extraneous substance did not get into the bladder, and form a nucleus for the stony matter. Where the calculous

diathesis happens to be very great, a bit of coagulum, or a clot of mucus, often forms the nucleus of a stone: but in patients where the disposition to calculus is not great, these coagula and clots of mucus do not prove sufficiently attractive. I am disposed to think, that a portion of a metallic bougie, a bodkin, or a needle*, or a shot, placed in the bladder of any person, would have a calculus formed upon it, even if there did not previously exist the slightest predisposition to calculus. Such substances could not lie in the bladder without exciting irritation, and that would increase the quantity of mucus, which, I apprehend, would constitute the chief

* Needles and bodkins have frequently been found incruusted only at the two ends, all the intermediate part being perfectly free from calculus, and the whole together resembling a bar-shot in shape. This may be considered an additional proof of the calculus being formed from the vesical mucus, because the two ends must constantly have lain in the mucus: while little or none of it came into contact with the intermediate part, and that little, if any, was liable to be washed off by the urine before any concretion had taken place. And as we may suppose that no part of the needle, except the two ends, would irritate the bladder, so we must believe that the largest quantity of mucus would be thrown out where there was most irritation.

source of the calculous matter, and in this way the extraneous substance not only forms a nucleus, but actually gives rise to the secretion of the earthy matter which concretes upon it.

I have not yet considered this subject sufficiently, to be able to determine the difference between the calculi which are formed out of the urine, and, those which are formed from the mucus of the bladder; I suspect, however, on two or three accounts, that none but the white stone is formed from the vesical secretion, and this, most probably, is composed of the phosphate of lime, magnesia, or ammonia. One reason for this opinion may be mentioned, viz., that all calculi formed over extraneous substances introduced within the bladder, are found to be composed of the phosphates. Renal calculi, on the contrary, are almost always brown coloured, and these, no doubt, are generally formed from the urine*. Se-

* Dr. Prout remarks (p. 185), "Nephritic calculi, composed of the phosphates, certainly exist, *though they are very rare.* This probably depends upon various circum-

condly, when a stone is composed of different coloured strata, the white is almost always the outermost, which I would adduce as another proof of calculus being formed from the vesical secretion, because we may suppose that the earthy matter of the vesical mucus would not be secreted in sufficient quantity to concrete, till the brown part of the stone, formed by the urine, was large enough, or had

stances. In the first place, this form of the disease is seldom original, but consequent to others; but in every instance of this description, the particulars of which I can trace, it has occurred only in very severe and obstinate cases of the phosphatic diathesis; and, in the only case in which it has occurred to myself, it took place in a gentleman, who suffered the most excruciating agonies, from the existence of a calculus in the bladder, composed of the phosphates." Although these facts have been brought forward by Dr. P. to prove that phosphatic calculi in the kidneys are formed from the urine, I would adduce them as being very strong proofs that they are formed out of the mucus secreted upon the surface of the urinary passages. There is every reason to believe that precisely the same kind of mucus is formed to defend the kidneys and ureters, as is secreted for the protection of the bladder; and it is well known that the membranous lining of the kidneys and ureters is very liable to become diseased in consequence of its sympathizing with irritation or disease of the bladder. Nephritic calculi, composed of the phosphates, may then certainly be formed from the mucus of the kidney, when it happens to be poured forth in unusual quantity.

existed long enough in the bladder, to irritate it, and cause a great increase of its mucous secretion. And, lastly, it appears the more probable that the bladder secretes the phosphate of lime, because it is well known that any vessels of the body may secrete that substance, and the stony matter which I chipped off those catheters, which have been mentioned, was white.

The foregoing facts shew, I think, that stone of the bladder sometimes actually arises out of a morbid state of that viscus, but whether this happens to have been the case, or that the calculus has in the first instance been produced from the urine, yet when once stone exists in the bladder, it must be very evident how, like many other diseases once produced, it may afterwards become the cause of its own further increase. The importance of this last observation will be more clearly understood, when considering the treatment of calculous disorders.

ON THE TREATMENT OF STONE IN THE BLADDER.

THIS may be divided into the palliative and the curative; the latter of which comprehends the entire removal of the stone from the body, and remains hereafter to be considered.

The palliative consists in lessening the effects of the calculus which has formed, and in preventing its further increase. The ill effects of a calculus arise from its attrition against the bladder, and from its mechanical obstruction to the flow of urine; but, as the latter is only temporary, being generally removed by a change of position, it seldom requires medical assistance. I shall therefore chiefly notice the irritation which results from the friction of the stone against the bladder. The degree of irrita-

tion produced by a stone in the bladder varies according to its roughness, its motion, and the susceptibility of the parts.

The friction of a stone may be very considerably influenced by the exercise of the body ; hence patients with calculus in the bladder should remain as quiet as may be consistent with their health in other respects, and when they move they should be careful to do it in that way which is found to excite the least inconvenience. Walking, or riding in an easy carriage upon springs, commonly excites the least pain, therefore should always be recommended in preference to other modes. If pain has been produced by other attendant circumstances described in the foregoing pages, it must be allayed by the use of anodynes, aperients, warm bathing, and complete rest. So far as the irritation of a calculus depends upon the roughness of it, this can only be palliated by rendering the system generally, and the bladder in particular, less susceptible of irritation. This may be accomplished in some degree by the use of opiates, camphor, &c. ; but, if these reme-

dies be taken for more than a certain continuance, they are liable to increase the evil they are intended to prevent : there is but one way of permanently rendering the bladder in the least possible degree irritable, and that is by keeping the general health good. For this purpose some exercise is necessary, but it must be short of that which produces much irritation in the bladder, otherwise the general health is sure to be impaired.

The patient must have a due proportion of rest in bed every night; his mind must be kept free from care and anxiety, and the body must be properly nourished by the plainest kind of food, such as is light and easy of digestion, and it must be nutritious, also, that a moderate quantity may suffice, The health of the system necessarily includes freedom from disorder in the digestive organs. To be brief, I may say that all those means which have been recommended to allay and keep off irritation of the bladder from other causes, may occasionally prove useful in cases of irritation resulting from calculus. If any class of

remedies, however, be more particularly useful than others in cases of stone, it certainly is the alkaline, *e.g.* aqua calcis, soda potassa, magnesia. Aqua kali puri & tinctura opii are frequently attended with the best effects. Soda and potassa often afford great relief when taken in substance, but I have known instances where they seemed to lose their effect, and even to disagree in that form, but if dissolved in a large proportion of water, they have then preserved the patient free from pain. Occasionally exciting the urinary secretion by means of the bals: copaibæ in small doses does good, but this requires much caution, otherwise it may aggravate the patient's sufferings. Irritation in the bladder is often known to operate by sympathy upon the kidneys, and diminish their secretion: when this appears to have happened, a little bals: copaibæ in small doses, to excite the urinary secretion just sufficient to compensate for the unnatural diminution of it, affords relief; but if it be given to produce more effect than that just mentioned, then by stimulating the kidneys unnecessarily it will cause an increase of

pain. I think too that the bals : copaibæ has some effect upon the mucous secretion of all the urinary passages, therefore if those mucous secretions be deficient the parts are then sure to be morbidly irritable, and such irritation may often be lessened by delicately managing the bals : copaibæ. Soda and bals : copaibæ is a useful combination. From what has been said above it must be obvious that the bals : copaibæ cannot be proper for stone patients for more than a few days at a time.

Uva ursi has been very much recommended in cases of stone in the bladder, but as I have expressed my opinion of that medicine when treating of irritable bladder with mucous discharge, I have nothing to add in this place. If the system or the digestive organs be weak and irritable so as to require some slightly astringent tonic remedy, then uva ursi, camomile, columba or gentian may severally prove useful; but I imagine they only operate to benefit the bladder through that organ's sympathizing with the improved state of the stomach, or by the urinary organs partaking of the

amendment in the health and strength of the whole system. Hitherto I have only spoken of opium as an anodyne acting upon the whole system, but it may be considered as a valuable stomachic. If stone cause great irritation in the bladder, it is very apt to disorder the stomach by sympathy, and under these circumstances, I am acquainted with no medicine so efficacious in improving the digestion as opium. When the stomach happens to be in a state that may be improved by either of the mineral acids, then such remedies will mitigate the irritation in the bladder ; but, generally speaking, the alkalies afford most relief to stone patients.

The effect of a calculus rolling about within the bladder will be different, according to the state of the system and of the bladder, and may be explained by reasoning upon the effect of friction against a part of the external surface; thus the same degree of friction upon the hands of two persons possessed of different degrees of health and strength, will operate differently ; upon a strong, healthy person, it

will harden the skin, and lessen the sensibility of the palm ; but the same degree of friction would cause inflammation, and blisters upon the hand of a very delicate, weak, unhealthy person, and precisely the same difference would be experienced by the former person in a different state of health.

If the calculus be not particularly rough, and if the patient do not take improper exercise, and his general health can be maintained good, then the sensibility of the bladder will be diminished, by the above plan of treatment, and the patient very probably will feel no inconvenience from the stone ; but if the general health be impaired, and the whole system irritable, the bladder will be sure to partake of the general irritability, and then the irritation of the calculus will occasion severe distress and pain.

When violent pain and spasm of the bladder have been brought on by stone, the patient must obtain a truce from his sufferings by the use of anodynes, warm

bathing, complete rest, and perhaps oleum ricini, or such like aperients ; enemas with terebinth & opio, are excellent ; but the only way to keep off future attacks is, to carefully preserve the best possible state of the general health.

Having shewn how the ill effects of a calculus in the bladder may be moderated, or altogether prevented, I shall proceed to point out the means of obviating any further increase of the size of the stone.

It is acknowledged that some calculi in the bladder are formed from the urine, and I imagine that, after what has been mentioned a few pages back, on the theory of calculus, it can no longer be doubted, that other kinds of calculi are formed out of the secretions which take place from the membranous lining of the bladder. At the time of writing those observations I omitted to notice one fact, thinking it might be better introduced in this place, and which appears to add great weight to those already advanced ; viz., that those patients which have calculi composed of

the phosphates, are always observed to suffer in the bladder more than others ; and the urine which they pass is so loaded with mucus, and altogether so extremely offensive, that few people can bear to remain in the room with such patients ; and it is also generally acknowledged, that such patients suffer more than others in their general health, and always have their digestive organs very much disordered. The pain resulting from stone in the bladder must either be the effect of the roughness of the surface of the calculus, or of the susceptibility of the parts upon which it operates. The roughest surface is always met with on the oxalate of lime, or mulberry calculus ; but this is not attended with so much pain as those calculi which are composed of the phosphates, and these latter are often remarkable for having a smooth and even surface ; it must therefore be evident, that the greater pain which accompanies the phosphatic calculi, can proceed only from the much greater sensibility of the parts upon which they operate. I apprehend this morbid state of the parts is always induced before the phosphatic

calculi begin to form, because they seldom are original, unless they form on extraneous substances placed in the bladder, which, no doubt, operate to produce the phosphatic calculi, by irritating the bladder, in the same manner as calculi would do; but if either the bladder or the kidneys happen to be in a state of extreme irritation, as they are then liable to pour forth an unusual quantity of mucus, though such irritation be the effect of disorder in the digestive organs, that may give rise to the phosphatic calculi. Another circumstance suggests itself, tending to prove that the phosphatic calculi are formed from the vesical mucus, which is, that they are very seldom laminated, which, in my opinion, rather evinces them to be the cause of their own increase, by their presence constantly keeping up a copious morbid secretion of mucus.

Taking it for granted, then, that some calculi are formed from the urine, and some from the mucus of the urinary passages, it is reasonable to suppose, that whichever may have been the source of the

calculus, that source must have been a morbid secretion; and consequently the surest way to prevent an increase of the calculus is, to preserve all the secretions of the urinary organs in a healthy state.

To enable us to direct our measures for this purpose, with the greatest possible chance of success, it may be very useful to examine into the state of the above-mentioned secretions; but this I am confident of, that if we direct our attention too exclusively to those secretions, and then regulate our prescriptions agreeably to the known laws of chemistry, we shall often be led into error. Chemistry, for instance, would teach us not to order alkalies when the urine was strongly alkalescent; and yet I have related a case in a former part of this essay, when speaking of irritable bladder with discharge of mucus, in which there was an amazing quantity of white, earthy matter discharged along with the urine, and the latter was (judging from the smell of it) as strongly alkalescent as possible. With the exception of such an attention to diet as was necessary to keep the

stomach and bowels healthy, nothing afforded the patient so much comfort, and preserved the urine so free from mucous and earthy matter, as pills composed of soda, Castile soap, oil of juniper, and guaiacum. When he took these pills, his urine every now and then appeared to be perfectly natural. It will be recollected that I attributed the good effects of these pills to their preserving the bowels regular. Another curious fact may be related, to shew the uncertainty that sometimes exists of our being able to control the urinary secretion.

CASE.

I was attending a lady who had diabetes mellitus; the urine, as usual, contained a great deal of saccharine matter, and tasted perfectly sweet. She had a plan of diet laid down for her, and she took pil: hydrarg: pro re nata, et sodæ carbonas ̄. acid: tart: durante effervescencia, ter die. Under this treatment she very shortly became quite well; the state

of the urine being as healthy as possible, in colour, smell and quantity. She was directed to persevere most accurately in the same treatment, with a view to permanently establish her health. The same diet was observed, and the same medicines were taken, which had effected the cure; but whilst these means were employed, the urine lost its natural odour, and had no perceptible smell; it lost its healthy colour, and became limpid as pure water; was secreted in as great quantities as when she had been in the worst state of health, but, instead of tasting sweet as before, *it was now sour as vinegar*. The acid state of this colourless urine constitutes an exception to the general statement which has lately been made by an ingenious author, that pale urine is alkaline.

I am disposed to believe, that whatever tends most to make the general health good, and preserve the digestive organs free from disorder, will have the best effect in correcting a morbid state of the secretions peculiar to the urinary organs. There is no remedy or class of

remedies which will certainly render them healthy, if the digestive organs be disordered ; and if the latter be healthy, then the former have a spontaneous disposition to become healthy also. There are, however, some states of the digestive organs which cannot be very clearly ascertained, without examining the urine, and on that account its appearance deserves attention. If there be acidity in the *primæ viæ*, the urine is almost always pale, and whether it then be alkaline or otherwise, it is an indisputable practical fact, that the surest way to render the urine healthy in colour, smell, and quantity, is to correct the acidity in the stomach ; and this may be done either by attending solely to the diet, or by administering potassa, soda, magnesia, or other alkalies ; and by the latter means the state of the urine may often be improved in a few hours. The effect of this treatment appears to me explicable only by supposing that it relieves irritation in the stomach, which is propagated to the kidneys by sympathy ; or else it ensures a more complete assimilation of the food, and consequently pro-

vides a more perfect material for the kidneys to secrete from. If, then, the pale urine be generally alkaline, and often admits of being rendered healthy by the taking of alkaline medicines, those remedies may be said to restore the natural acids to the urine*, which certainly never would have been anticipated from any chemical analysis of the morbid secretion.

Since, then, the surest way to preserve the urine healthy, is to keep the digestive organs healthy, so far as the growth of the calculus depends upon a morbid state of the urine, the most effectual means of preventing its increase of size is, to preserve the chylopoietic viscera in perfect health.

Those calculi which are formed from the morbid mucus of the bladder, become the cause of their own increase, by irritating the bladder, and causing it to continue to throw out the same kind of discharge; hence, the only effectual means of prevent-

* That healthy urine is acid, is shewn by its reddening litmus paper.

ing their further growth, are such as will counteract or prevent the ill effects of the irritation from the stone, and these happen to be the same as have been already mentioned for the prevention or cure of irritable bladder; for whether the bladder has become irritable in consequence of the friction of a calculus, or from some other cause, it matters not, for precisely the same means, varied according to the existing state of the bladder, will be equally applicable for its cure; only if a calculus be present, rest becomes more necessary than under other circumstances, that being the only means of lessening the cause of the vesical irritation. The ensuing case is an instance of a stone patient being rendered tolerably comfortable by little else than attending to his diet.

CASE.

A gentleman, about eighty years of age, had stone in his bladder, which had been ascertained by sounding, and was otherwise indicated by the usual painful symptoms. He could not ride in any carriage

without being distressed with pain, and voiding bloody urine; and he was at other times subject to severe attacks of pain in the bladder, which were very apt to be brought on by drinking spirits and water. He also sometimes thought himself worse after taking tea or coffee.

He had been in this state for many years. I told him he was too old to think of an operation, and he then said that he had decided against it himself. I advised him to leave off tea and coffee, and all kinds of spirituous drinks; to live upon mild, nutritious food, taken in moderate quantities, and as much as possible to confine himself to a milk diet; to avoid all unnecessary exercise, and to allow himself plenty of rest in bed. He was also directed to pay especial attention to preserve his bowels regular. I recommended him some pills, composed of castile soap, soda, guaiacum, and oil of juniper, which he was to take occasionally; and if, perchance, he suffered violent pain, he might procure ease by bathing in warm water, and taking tinct: opii. I did not see him again for

about two years, and then met him in a stage-coach, going to travel a distance of more than 100 miles. He assured me that the milk diet appeared to do him more good than any thing. He could travel in a coach without inconvenience, and no longer passed bloody urine afterwards ; and, though he could every now and then feel the calculus roll about the bladder, it did not cause any pain worth mentioning.

ON THE RADICAL CURE OF STONE IN THE URINARY BLADDER.

THIS consists in the entire removal of the calculus from the bladder, either by means of lithontriptics or by an operation.

Numerous medicines have been said to have the power of dissolving stones in the bladder. I believe, however, that no well-authenticated instance has occurred of a perfect cure by such means. On the contrary, it is now generally thought that no remedy has the power of dissolving a urinary calculus whilst it remains in the bladder, but I imagine there is some reason to doubt upon that subject. Crystallized calculi and the most compact kinds of laminated ones will very probably never be removed by lithontriptic medicines, but there are some stones of so loose a texture that they

crumble to pieces upon very slight pressure : they may be compared to a ball of sand cemented together by the vesical mucus ; such I can readily conceive may be acted upon by the urine in certain states of it, so as to separate and ultimately be washed all away. I can also suppose it possible for some kinds of laminated calculi to be removed in a similar manner. Therefore as the state of the urine may confessedly be greatly influenced by a variety of medicines, I do not think we ought to despair of finding remedies that may cause the dissolution of some kinds of calculi. I was led into the foregoing reasoning principally from having met with the following

CASE.

An old man, who had been a soldier, but was discharged on account of ill health, suffered severely many years from stone in his bladder. He consulted several practitioners, and for a long time was under the care of an eminent physician attached to a

public hospital, who ultimately recommended him to go into the Institution and have an operation performed. The poor fellow could not, however, make up his mind to this, so continued to bear his disease till at last he met with an empiric, who undertook to cure him. The medicine came to the patient in quart bottles, and he was directed to take a quarter of a pint three times a day. He very soon lost all pain, and scales of stone came away in his urine, till he had collected a quantity which I should judge would have weighed two ounces or more, and upon inspecting these pieces of calculous matter I have no doubt of their having formed parts of a large calculus, because many of them had a concave and a convex surface. When these ceased to come away, as the man felt no pain, and in other respects was quite hearty, he believed himself to be cured, and paid nine pounds for the medicine.

Some time afterwards, however, he began to suffer again, which convinced him that

the whole of the stone was not removed : he had recourse to the medicine again with the same effect as before, and by never omitting it, kept himself free from pain for some years till he died. I obtained some of the medicine, and upon its being analyzed it proved to be nothing more than potassæ subcarbonas et aqua, in the proportions of half an ounce to a pint. The man could not be prevailed upon to part with the pieces of calculus which he passed, neither have I been able to procure them from his family since his decease, which I did not hear of till long after his funeral ; otherwise, if permission could have been obtained, the examination of his body would have been very interesting.

The alkalies are such common remedies for calculous complaints, that I am rather surprised this man should not have been relieved by a regular practitioner. I can only account for this by supposing that he never before tried enough of the medicine, for it will be seen that he took large quantities, no less than three drachms a-day when he obtained relief. Perhaps, how-

ever, he might not have taken so much diluent with it before, which I have particularly mentioned as causing a vast difference in the effect of alkalies in some cases.

ON THE OPERATION OF LITHOTOMY.

INCISING the bladder for the purpose of extracting a stone, is always attended with some degree of danger ; but as it is much less dangerous under some circumstances than it is under others, and as we are never called upon to operate for stone, as we are in some other diseases, at a moment's notice, it gives us an opportunity of preparing the patient, so as to bring him into that state which is most conducive to success ; I shall, therefore, proceed to give some directions for this purpose before describing the operation. I think this the more needful, because the safety of the patient often depends more upon the previous and subsequent treatment than upon the manner of doing the operation ; this, however, will be rendered most evi-

dent, when I come to speak of accidental injuries of the bladder.

The operation of lithotomy never succeeds, if performed either when there exists any material disorder of the digestive organs, or when the patient discharges pus with his urine : if, therefore, either of these circumstances prevail, suitable means must be employed to remedy it; and without that can be effected, the operation ought not to be undertaken. Neither should the operation be performed if there be reason to believe the existence of disease in the kidneys. The general health, too, demands most serious consideration, in deciding on the propriety of operating for stone. The state of the bladder will greatly accord with the state of the rest of the system. If the constitution be morbidly irritable, there will be reason to fear that the operation would be followed by such violent and extensive inflammation, as would prove fatal ; and if the patient were both irritable and weak at the same time, were the operation to be performed under such circumstances, there would

scarcely be a chance of a happy result, for the irritability would create great inflammation, and the weakness would incapacitate the patient to support the use of such measures as would be necessary to subdue it. Again, too, it is very possible for patients, although not irritable, to be so weak as to be incapable of repairing the necessary injury of the wound in the operation, so that the constitution may sink in the attempt, or perhaps make no attempt at such reparation. Possibly there may be such constitutional debility, accompanied by irritability, that the parts being incapable of setting up the adhesive inflammation to heal the wound, ulceration may commence at the edges of the wound internally, and spread so far over the bladder as to prove destructive to life.

On the other hand, it is not well for the patient to be in a very vigorous state of health, for, if he be in a state of excitement that we may term *above par*, then the operation would be very liable to cause too much inflammation, as will be hereafter explained. There must be health and strength enough to produce a certain de-

gree of inflammation, otherwise the wound cannot heal; but more inflammation than what is necessary for that, is always to be considered dangerous. Too much and too little tone in the system must be carefully shunned, but that which is of the greatest consequence is, to guard against morbid irritability. If there be sufficient power in the system at large, too much action in the parts can often be reduced, and too little action may often be increased; but if there be morbid irritability, that will be very difficult to control, and no practitioner can ensure a successful termination under those circumstances; and if morbid irritability and weakness should exist together, there would scarcely be a chance of recovery. The preceding observations are clearly explained by the following

CASE.

Enjoying all the advantages of pure air in the country, being in excellent health, and having much leisure time, it tempted me to make an experiment upon myself, for the purpose of obtaining some accurate

knowledge of the different kinds of inflammation. I began by eating very abstemiously ; I took only vegetable food, and drank only tea or water ; I lay a good deal in bed, took very little exercise, studied none ; in short, I led the most idle life possible, with a view to avoid every source of expenditure, and thus give me an opportunity of reducing gradually all the powers of my body by means of low diet, without the risk of becoming irritable ; for, if the expenditure of the system be greater than the supply, it is certain to create irritability. At last I was brought into a state more like vegetating than living like an animal : I was exceedingly reduced, very weak and idly disposed, but the constitution not in the smallest degree irritable. At this time I destroyed a wart upon the middle finger of my right hand by means of nitric acid. Three days afterwards I picked away the dead parts ; and although that operation appeared to lay open some vessels, they did not bleed. There then remained a circular sore, with a flat surface and perpendicular edges. I covered it with emplastrum adhesivum, and continued the same kind of

idle life and low diet. For about ten days I examined the wound every day, and in all that time there was not the slightest progress towards healing; there was no surrounding inflammation; the parts had no more colour than before the nitric acid was applied; the wound neither granulated nor secreted pus; in short, it remained exactly in the same state as after first picking away the slough, only that it discharged a small quantity of serum. This led me to conclude that, as there was no inflammation, the only reason why the wound did not heal must be the actual want of power to institute the healing process.

I then tried the effect of the same local treatment, and the same kind of spare diet with very little sleep; I also studied and sat up late at night. This soon made me irritable, and then a little inflammation came round the wound; there was also a slight discharge of thin pus or serum, and the wound grew larger by ulcerating. This clearly shewed me, that the principle of ulceration was *irritability with debility*,

for in this instance, the whole system being both weak and irritable, the wound proved a source of irritation to excite the actions of the part, and as there was too much weakness to effect any thing but absorption, that alone took place and constituted ulceration. I then tried the effect of the same local treatment, and continued to study and sit up late at night, but allowed myself a tolerably generous diet. Under this plan the ulceration did not appear to cease, but the surrounding inflammation spread exceedingly; the back of my hand inflamed, swelled, and became œdematous, and red absorbent vessels appeared upon the inside of my arm. The constitution now possessed more power than before, but it was perhaps more irritable; hence the irritation of the wound excited a disproportionate degree of inflammation, and although there was power enough to institute inflammation, it was *not of the right kind*, it was not the adhesive inflammation, hence reparation could not go on; there was not power enough for that purpose. The œdema and red absorbents decided it to be inflammation with

irritation and weakness; it extended, therefore, rapidly, by continuous sympathy, because all the surrounding parts were in a highly susceptible state. There now remained only one thing more to be tried, and that was to get my hand well. I bathed it twice a-day in warm water, and covered it with bread and water poultice. I ate plenty of animal food, with other nutritious things, took plenty of sleep, and drank better than a pint of dec : cinchonæ daily. Under this treatment the inflammation soon retired within due bounds, and became of the proper kind; and the wound granulated and healed. I scarcely need to say that the cure was effected by imparting strength and removing irritability.

The foregoing experiment clearly shews, that the best state for any patient to be in at the time of undergoing a serious operation is, a moderate degree of health, particularly free from morbid irritability. The more actual strength that a patient possesses, provided he is perfectly free from irritability, so much the better will he be able to bear, and recover from, the

operation; because, in proportion as the living powers are strong, so does the operation make the less impression upon them; and it will be succeeded by the less inflammation, for it is an invariable law in the animal economy, that wounds in healthy parts, which are not vital organs, will always be attended by a degree of inflammation proportioned to the degree of the injury, and so far as the wound alone is concerned in exciting it, the inflammation will be no more than what is necessary to heal the wound. This alone should be the surgeon's guide in preparing a patient to undergo any serious operation; to lessen the irritability of the system as much as possible, and to remove every source of morbid irritation, and then the more strength he possesses the better (as before observed) will he bear the operation, and the sooner and more perfectly will he recover from it. It is irritability alone which excites a disproportionate degree of inflammation, and if there be strength at the same time, then certainly we may expect the inflammation to be the more violent; but let it always be remembered, that inflammation with strength may be more certainly subdued than in-

flammation with weakness; therefore of the two, inflammation with strength is least to be dreaded. Actual power in the system, abstractedly considered, tends to confine the inflammation within due bounds, and make it what it ought to be; but if the patient do not naturally possess a strong living principle, it never can be imparted to him, and any attempt to give a temporary increase of the powers of life by artificial means, will only place him in an unnatural state of excitement, which will prove unfavourable to his recovery, because the whole system, being already in an unnatural state, will be the more likely to be disturbed by the operation, and will the more readily take on diseased action in every part. Therefore in preparing a patient for undergoing any serious operation, our aim should be to remove every kind of irritation, and to bring the whole system into the most tranquil state possible, without attempting to raise the powers of life above their natural standard*.

* So much requires to be said upon the above subject, that the author is obliged to reserve all further observations for his intended Essay on Inflammation.

To accomplish this, it is also necessary to remove, as far as possible, every source of mental care and anxiety, for, if the mind be too much excited, it cannot but produce a degree of nervousness and irritability of the whole system. If the patient is in business he had better retire from it for about a month, and during that time he should confine himself to plain mild nutritious food, and if milk agrees with him, he had better take bread and milk morning and evening, instead of either tea or coffee. Great attention should be paid to preserve the bowels regular, and all the secretions healthy. None but mild aperients, however, are to be recommended, such as manna, oleum ricini, soda vitriolata, magnesia, or perhaps pulvis rhei. Once a-week or every four or five days, possibly a small dose of *pilula hydrargyri c̄ opio vel hydrargyri submurias c̄ opio* may prove useful.

Warm bathing should also be employed. I am acquainted with scarcely any thing that conduces more to allay nervous irritation than the warm bath; and I do not know a single objection to its being used

in the generality of cases. In my opinion, it is much to be regretted that the warm bath is not more used. I would have every stone patient go into it daily, for at least a week previous to undergoing the operation.

Bleeding has been recommended by way of preparing a patient for lithotomy ; but I have no hesitation in condemning it as always improper, if resorted to merely with a view to prepare for the operation. If the patient be too plethoric, by far the best method of reducing him is to confine him to abstemious diet, and administer gentle cathartics. The great object in preparing a patient for lithotomy, I have stated to be, the removal of irritation or irritability from his system, and this often cannot be done suddenly ; to be done certainly, it must be done gradually. Bleeding will reduce the patient more speedily than any other means ; but let it be remembered that irritability often results principally from debility, and they very generally exist at the same time. Bleeding can only relieve irritability when it results

from inflammation, and when any part of the body is affected with so much inflammation as to require bleeding for its cure, the operation of lithotomy should not be contemplated. Bleeding, therefore, can never be proper as preparatory to the operation of cutting for the stone, an operation which never requires to be done at a moment's notice, therefore it is inexcusable not to take time and pay the utmost attention to bring the patient into that state which is most conducive to his safety. There cannot be a question but the operation of cutting for the stone would be still more successful than it now is, if more care was taken to prepare the patients for it.

On the morning of the operation, the lower bowels should be cleared of their contents, and for this purpose I would recommend a large enema of at least two or three pints of plain warm water to be administered, because fæces lying in the rectum endanger the wounding of that intestine in the operation. It is desirable that the bladder should contain urine, therefore

the patient should be directed to hold his water for some hours previous to the operation ; and, if he has any inclination to pass urine when he goes to stool, he should be taught to restrain the flow of it at those times, by squeezing the penis between the thumb and finger. There now remains only one more observation to be made before describing the operation, *viz.*, that although the existence of a calculus has been ascertained by sounding, it is absolutely necessary that the stone should be felt at the time of the operation, and without this can be done the operation ought never to be performed. In speaking of the symptoms of calculus, I mentioned that the stone sometimes escaped between the muscular fibres of the bladder, and became encysted in a sac formed by the membranous lining of that viscus which it had pushed before it, thus it is very evident that the stone may be in the bladder at one hour and out of it the next ; it is therefore always necessary to feel the calculus in order to ascertain that it lies in the bladder, immediately before

making any opening to extract it. Whether this precaution had been neglected, or that the stones became encysted during the operation I am unable to say, but I have been told of three able surgeons who having cut into the bladder, were not afterwards able to discover any calculi.

Supposing then that all due preparation has been made, the patient should be placed so as to lie on his back. His legs should be bent up till his heels come very near to the nates, and should be secured there by bringing the hands to meet them, and by tying the ankles and wrists together. A grooved sound or staff having been introduced, and the stone felt, the handle of the instrument should be given to an assistant, for him to maintain it steadily in a perpendicular direction. The assistant should at the same time hold up the scrotum that it may not interfere with the subsequent parts of the operation. The first incision should commence on a line with the bulb of the urethra, and be carried down the left side of the perinæum till it has passed between

the anus and left tubor ischii. The length of this incision must vary according to the size of the patient, and the thickness of fat to be cut through: in adults it seldom ought to be less than three or four inches, as a free external incision is always desirable. The operator must carry on his incisions in the same direction till he has divided the transverse perinæi muscles and has past the bulb of the urethra far enough to feel the staff in the membranous part of the canal. He should then place the nail of his left forefinger against the groove of the staff, and guide the knife along his nail to make an opening into the membranous part of the urethra; this done, he will keep his finger-nail in the groove of the staff till he has placed the beak of the gorget there; then rising from his seat he is to take hold of the staff, and having moved the beak of the gorget to and fro a little, to ascertain that it is in the groove, he must depress the handle of the staff to elevate the point, and at the same time slide forward the gorget into the bladder. When an opening has been made in the

bladder, both the staff and gorget should be withdrawn. The forceps are next to be introduced, and they should remain closed till they touch the stone. In taking hold of the calculus the surgeon should not open the forceps laterally but vertically, or up and down, and endeavour to get one blade of the forceps under the stone. Having grasped the calculus it may be carefully and slowly extracted if it will come away easily; but if there be any difficulty, a finger should be passed into the bladder to feel if the stone can be taken hold of more advantageously, or whether the difficulty arise from the great size of the calculus: if the former be the case, perhaps the operator may be able with his finger to turn the stone between the blades of the forceps; but if this cannot be done, the stone should be let go and be taken hold of again; but if the great bulk of the stone occasion the difficulty, it will then be necessary to enlarge the wound laterally, by means of a straight probe-pointed narrow bistoury guided along the forefinger of the operator's left hand.

The stone should always be withdrawn by a steady motion without any twisting; if the motion requires any variation, it must only be a little from side to side. If the stone be round or oval with a rough surface, most probably the bladder contains no more, but if the surface be smooth and polished, very possibly there may be more, and this will be rendered still more probable if the stone have a smooth flattened surface on one side, and be rough in other parts. To determine this point, however, the surgeon should always examine the bladder with the greatest care after the operation.

The staff is very commonly directed to be inclined by the assistant towards the patient's right groin, for the purpose of making its convexity cause the perinæum to bulge out whilst the first incision is being made. I think, however, this often occasions the bulb of the urethra to be opened, which is quite unnecessary and had better be avoided. Depressing the handle of the staff towards the groin is objectionable too

on another account; it is very liable to draw the point out of the bladder, and then it cannot serve as a proper guide to the gorget. The surgeon should make sure of the staff's being in the bladder before he attempts to push forward the gorget, and I think this is best done by taking care not to withdraw the point of it, as may happen in depressing the handle towards the right groin, therefore I have directed the staff to be held perpendicularly till the gorget comes to be passed. In sliding forward the gorget, the surgeon must be extremely careful to depress his right hand sufficiently to keep up the beak, and let no other part touch the staff; otherwise the gorget being straight, if any part but the beak come into contact with the convexity of the staff, the beak will inevitably be thrown out of the groove, and very likely be made to pass into the rectum, or between that and the bladder. Such an accident as that just mentioned has been known to occur many times, and I am persuaded it has generally been occasioned by the surgeon's neglecting to depress the handle of the gorget sufficiently. This

constitutes an additional reason for cutting into the urethra beyond the bulb ; because the shorter the distance is which the gorget has to travel before entering the bladder, the more it will move in a straight line, and, consequently, the less danger will there be of the above accident. But another very important reason for taking extreme care to elevate the beak of the gorget is, that without such attention that instrument cannot be made to pass in the axis of the bladder, but will be very liable to transfix the lower part and wound the rectum through it. The gorget having been passed into the bladder, is very commonly retained there till the forceps are introduced. This, in my opinion, is improper, because the urine being evacuated, the bladder sometimes contracts very forcibly, and of course must be liable to be injured by the gorget, in proof of which, I have seen two small stones expelled through the wound solely by the contraction of the bladder ; and as a guide to the forceps the gorget is quite unnecessary, because, if they can be introduced a second and a third time, or oftener, without any

gorget to direct them; surely they might be passed without such a guide equally well in the first instance.

The forceps, as before observed, should be kept shut, and used as a sound to ascertain the position of the stone before they are opened; and in laying hold of the calculus, one blade should, if possible, be got under it, as this is the most likely way of grasping the stone in its shortest diameter, for if it be flat or oval, and the bladder contain urine till it is cut into, the chances are greatly in favour of the stone's resting on its broadest surface. The disadvantage of expanding the forceps laterally to grasp the stone, (as happens to be most convenient to the surgeon when using both his hands,) was made strikingly evident by the following

CASE.

An old man, being properly situated for the operation, the surgeon made a way into the patient's bladder in the highest style

imaginable; nothing could excel the steady, cool, and correct manner in which the operation was thus far conducted. The forceps were then introduced, and they struck against the stone immediately. The surgeon then laid hold of the forceps with both his hands, and expanded them laterally, to grasp the stone, but in vain. He opened the forceps to the utmost, but still could not get hold of it. Another, and another, and another pair of forceps were tried, but none could be made to take hold of the calculus. A scoop was introduced, and the stone was very readily felt by it, but could not be extracted. Different surgeons present were requested to examine, and finger after finger was introduced, to ascertain the position of the stone, and decide what was best to be done. There was no difficulty in feeling the stone, but it could not be laid hold of. The operation had now continued more than an hour, and the case was about to be given up as hopeless, under an idea that the stone was encysted, when it was suggested that perhaps none of those forceps which had been used were large enough to

receive the stone between their blades. At last a larger pair than had been employed were brought, and being passed into the bladder, the surgeon expanded them, as he had done all the others, laterally; they grasped the stone, and brought it away, and then the cause of the difficulty was explained. The stone was of a very long oval flat shape, and lay with its longest axis across the bladder. It was so long, that none but those forceps which brought it away could expand wide enough to receive it lengthways between their blades, and those forceps having been opened laterally, they had caught hold of the stone by its two ends.

If the forceps in this case had been opened in the opposite direction, and one blade had been passed under the calculus, it would have been laid hold of instantly by any one pair of the forceps that were tried, and would have been brought away without difficulty, and then the operation would have begun and terminated in a few minutes, instead of lasting, as it did, for upwards of an hour.

When the forceps are in the bladder, they should always be moved about with gentleness, and great care should be taken to avoid laying hold of the bladder. Provided they are tenderly used, they may be introduced and withdrawn very many times, without doing any hurt. Some years ago, Sir Astley Cooper met with a very extraordinary case of lithotomy; the bladder contained one hundred and forty-two small calculi, and before all of them were extracted, the forceps were introduced about seventy times, but the patient recovered very well; therefore the frequent introduction of the forceps is not to be feared, if they be used with gentleness.

It sometimes occurs that the calculus is of so loose a texture, that it will not bear the usual pressure of the forceps without crumbling to pieces; when that happens, the scoop, most likely, will prove a very useful instrument: in some instances, if the scoop get fairly behind a calculus, it will rake or scoop it out; but in general, the best mode of using the scoop is to get it beyond the calculus, then to introduce

the forefinger of the left hand, and place the point of it in front of the stone ; by this means the stone may be held in the bowl of the scoop, whilst being extracted, by the slightest pressure imaginable, and thus all risk of breaking it again be avoided. Fragments of stone, which may be too small or too numerous to be removed by instruments, must be washed out of the bladder, by the injection of warm water from a large syringe.

OF THE TREATMENT AFTER THE OPERATION.

THE patient should be carried to bed, and be laid on his back with his thighs closed, be made as comfortable as possible, and kept perfectly quiet. Urine must be expected to flow through the wound, therefore cloths should be placed to absorb it, and their being removed as often as they become wet, will add greatly to the comfort of the patient. It is a good symptom for the urine to escape by the wound freely, and therefore the surgeon should pay especial attention to this circumstance. The disposition to heal is so great in some patients, that, in a short time after the operation, the wound, either partially, or wholly, unites, as other wounds do when healing by the first intention, and the surrounding inflammation prevents the escape of the urine through the urethra, and occasions retention. If

this be not prevented, the urine then goes on to accumulate in the bladder, till it forces open the internal lips of the wound, and thence is effused into the cellular membrane, and causes sloughing and death. Should the urine not be observed to come freely, either along the urethra, or through the wound, the surgeon had better insinuate his finger into the bladder, to ascertain that no retention exists; and, if that has occurred, or seems likely to take place, a flexible gum catheter had better be introduced, either through the whole length of the urethra, or through the wound, and be retained in the bladder to ensure an exit for the urine.

Cystitis and peritonitis are two other serious effects which sometimes result from lithotomy. As soon as either of these is discovered, the patient should be bled and put into the warm bath. The rest of the treatment must be regulated very much by the nature of the inflammation; if there be violent arterial action with great power in the system to support it, then, we must principally depend upon evacuants and

the warm bath. If the blood have a tough, buffy, cup-shaped surface on the crassamentum, then, venesection ad deliquium ought to be repeated every six hours, till the violence of the symptoms is mitigated. A small, weak pulse must not prevent the use of the lancet, because the pulse is oppressed the more, just in proportion as the peritonitis is the more violent. Under these circumstances, whilst the blood is being drawn away, the pulse will be found to rise and approach the natural standard. The bowels should be emptied by means of large enemata of warm water; the patient should be allowed to drink nothing but barley-water and such like diluents. Of medicines he should have hydrargyri submuriæ, effervescing saline draughts, with antimon : tartar : or cathartic mixture, composed of magnes : sulp : magnes : alb : et mannæ, or oleum ricini.

Blisters upon the abdomen are recommended, but they never should be applied before the violence of the inflammation has been materially lessened by other means, otherwise the symptoms may be aggravated

by the blisters ; and another great objection to their more early use is, that the soreness produced by them will prevent the possibility of judging accurately as to the impression made upon the disease, the surgeon may not be able to discriminate whether the tenderness of the abdomen arise from the blister or the inflammation, and the life of the patient may depend upon this distinction. Should the inflammation be more of the irritative kind, that is, violent arterial action with deficient power to support it, then the first bleeding must be small, compared to what it must be under other circumstances, a large enema of warm water should be administered, and the patient, after coming out of the warm bath, should have an anodyne injection. Fomentations must be unremittingly applied upon the abdomen, pubes, and against the perinæum, and the patient should take mild aperients.

No uniform plan of treatment can be laid down for the management of patients after lithotomy, much always must be left to the discretion of the practitioner. Some-

times, instead of keeping the patient low, it is absolutely necessary to ply him with cordials; a remarkable instance of this kind is related by Mr. Abernethy in his lectures.

CASE.

A patient, who was extremely weak, and otherwise ill from stone in the bladder, sent for Mr. A., who, having passed a sound, and discovered the calculus, proposed a consultation to determine on the propriety of operating; and a day was fixed for the operation. On the day before that on which the operation was to be performed, the patient sent for Mr. A., but was in such a weak state, he could not articulate so as to make himself understood. Mr. A. guessed that he wished to say that he thought himself too ill to undergo the operation, and thereupon told him, that the surgeons would meet on the following day, and consult upon the subject. The patient was perfectly delirious the following day, and Mr. A. did not like to operate upon him

while he was in that state; but, as the other surgeons thought the operation had better not be delayed, Mr. A. acceded to their opinion. The patient was quite delirious during the whole time of the operation, and being very chilly afterwards, was carried to bed and well covered with blankets. In the evening the patient's pulse were* so feeble, that Mr. A. could not feel them. The whole treatment of this case consisted in giving cordials. He became sensible in two days, and not till then did he know that the operation had been performed. He ultimately got well.

Occasionally it happens, that the wound made in lithotomy, instead of healing, runs into a state of ulceration, which extends into the bladder. The nature of these cases will be clearly understood, as well as the proper treatment for them, by reverting to the observations which I have made on preparing a patient to undergo the operation, I therefore need not repeat them in this place.

OF STONE IN THE BLADDER OF WOMEN.

CALCULUS in the bladder occurs much less frequently in women than it does in men; and several reasons may be assigned for it. Females in general live much more abstemiously and regularly than men do; secondly, their bladders are more seldom affected with disease of any kind, and hence they are less subject to have calculi form; thirdly, the female urethra is so straight, so short, and so readily admits of great dilatation, that women every now and then void large calculi merely by the usual efforts to expel their urine.

This latter circumstance suggested to surgeons the possibility of dilating the female urethra sufficiently to admit of the removal of stones without cutting, which was formerly effected by introducing instru-

ments, and thereby, in the space of a few minutes, dilating the canal enough to allow of the extraction of considerable-sized calculi ; but this plan has since fallen into disrepute, in consequence of the patients having frequently afterwards suffered from incontinence of urine. Such injury to the sphincter vesicæ, however, is not found to ensue, if the urethra be enlarged very gradually by means of sponge tents, by regulating the size of which the dilatation may be conducted as slowly as we please, without any kind of inconvenience, and to as great an extent as can be required at any time. It will be right to have a piece of flexible catheter passed through the middle of each tent, otherwise, from its obstructing the urine, it may not be possible to retain it long enough within the urethra. Some practitioners, however, prefer the operation of dividing the canal ; it may, therefore, be well to describe it. The woman must be secured in the same position as that before mentioned ; a perfectly straight staff is then to be introduced through the urethra, and the stone being felt, and the groove of the staff being turned towards the ca-

nalis uteri, a górges is to be pushed along it into the bladder. The forceps are next to be passed into the bladder, and the stone being grasped, is to be carefully extracted agreeably to the directions given when speaking of the operation in the male. Force must never be employed in bringing away the calculus, therefore if the opening be not large enough to allow the stone to pass easily, the forefinger of the operator's left hand should be introduced to guide a probe-pointed bistoury, for enlarging the wound. A roll of linen smeared with cerat: sperm: ceti should be kept in the vagina for a few days afterwards to promote the speedy union of the wound, and prevent an incontinence of urine which has sometimes been known to succeed to this operation.

Many instances are recorded of extraneous substances being introduced through the female urethra into the bladder; when this is known, they should always be extracted without delay, otherwise calculous matter is sure to accumulate upon them. This should always be done

without cutting ; for, as they have already passed once through the urethra, a very slight degree of dilatation will suffice for their extraction. The only difficulty which can arise must result from their lying across the internal orifice of the urethra. If this be ascertained, the operator should pass his finger into the bladder, and place the foreign body in the most convenient position for being caught hold of by the forceps.

Into the canalis uteri also, women have been known to cram cinders, pieces of coal, and other substances, which, being allowed to remain there, have occasioned symptoms similar to stone in the bladder ; therefore, if such symptoms prevail, when upon sounding no calculus can be discovered in the bladder, the vagina should always be examined.

ON INJURIES OR IMPERFECTIONS OF
THE BLADDER, THE EFFECT OF
DISEASE OR OTHER CAUSES.

OF THE CONTRACTED BLADDER.

THE bladder sometimes becomes so contracted, as to be almost incapable of holding any urine, many instances of which are mentioned in the forty-second letter of Morgagni's large work. In one case the cavity of the bladder did not equal the size of a pigeon's egg. Mr. John Hunter also speaks of contracted bladder in his work on the Venereal Disease; and it is a well-known consequence of stone. The explanation of this appears to be, that irritation of any kind in the bladder excites the individual to discharge his urine so frequently, that the bladder is never dilated to that extent which nature designed it should be, before the urine is

evacuated, and if this state continue during a long course of years, that viscus so accommodates itself to the small bulk of its contents, that ultimately it becomes incapable of containing more. Should the irritation be accompanied by any thing like inflammation, then the bladder thickens in its coats, as well as grows contracted.

ON THE TREATMENT OF CONTRACTED BLADDER.

This consists in allaying irritation by some of those means already mentioned, and by endeavouring to retain the urine longer at every subsequent time, by which the bladder will undergo more and more distention, till at last it possibly may be brought to hold the natural quantity of urine before the stimulus to void it is excited. It will be remembered that in one case of irritable bladder which I have related, after the morbid irritability had been removed, the patient still continued to pass his urine too frequently ;

I suggested that it might be merely the effect of long habit, and recommended him to accustom himself to retain the urine for a longer time, and this very soon enabled him to hold as much water in his bladder as he had done before it was attacked with irritation. In the early stages of contracted bladder, the above plan of treatment may be expected to succeed very well; but after a certain degree of contraction has taken place, and more than a certain time has elapsed, the imperfect state of the bladder is equally irremediable with contraction of muscles in other parts of the body.

OF THE SACCULATED BLADDER.

Sometimes it happens that the muscular coat of the bladder becomes very much contracted, whilst the mucous membranous coat is not contracted in the smallest degree, having been pushed between the muscular fibres, so as to form a sac or pouch exterior to the muscular coat, as already

explained when speaking of stones becoming encysted. This may be suspected to have taken place, if, after voiding four or five ounces of urine, the patient seem to have expelled all, but after waiting two or three minutes, the inclination to urine return, and then he voids more. Other causes may, however, give rise to the same symptom, therefore it must not be considered as infallibly denoting a sacculated state of the bladder. The sacculated bladder is sometimes produced by some obstruction to the flow of the urine along the urethra, which excites violent contractions of the muscular coat, and the urine pressing equally in all directions, is sure to find out any vacant space between the muscular fibres, and then pushes the membranous lining between them. All that can be done in these cases is to remove the impediment to the expulsion of the urine, which may prevent any further increase of the pouch, but there is no remedy for that which is already formed.

OF THE THICKENED FACICULATED BLADDER.

The bladder frequently becomes fasciculated, and very much thickened. On examining a bladder of this kind, the bands of muscular fibres have often an appearance very similar to those met with in the ventricles of the heart. This change usually results from disease in the prostate, or stricture in the urethra, exciting powerful action in the bladder, to force away the urine ; thus the bladder, like other muscles, has its strength increased by exercise.

OF THE PARALYTIC BLADDER.

The paralytic state of the bladder has already been noticed as a consequence of retention of urine, or some injury or disease of the spine.

OF HERNIA OF THE BLADDER.

The urinary bladder sometimes gets partially displaced, being protruded through

the abdominal ring, or under the crural arch, and thereby constitutes hernia. This may be known by an external tumour, which gradually increases as the urine accumulates in the bladder, and entirely disappears on its evacuation. If, however, part of the bladder has been pushed quite down into the scrotum, it is possible for the other part of the bladder to be emptied of the urine, without the herniary tumor subsiding; if, then, upon the herniary tumor's being pressed away, the patient can expel more water, this will render the nature of the case perfectly clear. Hernia of the bladder differs from most other herniæ, in having no peritoneal sac or covering. These cases are spoken of in general treatises on ruptures, and the treatment of them consists wholly in making the bladder keep its place, by the patient wearing a spring truss. Mr. Pott has related a case of this kind in his *Surgical Works*.

ON MECHANICAL INJURIES OF THE BLADDER.

INJURIES, the effect of disease, having been spoken of, there only remains for me to notice mechanical injuries.

OF MECHANICAL IRRITATION OF THE BLADDER.

The slightest kind of mechanical injury is that which results from the introduction of foreign bodies within the bladder. It is mere irritation, every way similar to that which results from the attrition of calculus. So far as this irritation is to be remedied by medicines, precisely the same will be proper as those which have been recommended to palliate the effects of a calculus. Permanent relief can, however, be obtained only by their extraction, and for this

purpose the same operations are necessary as those which have been mentioned for the removal of stone, but with one exception: if the substance happens to be a portion of Smyth's metallic bougie, it may be got away by injecting quicksilver into the bladder; the portion of bougie readily amalgamates with the quicksilver, and then comes away in a fluid state. We must, however, expect this treatment to prove successful only when it is adopted soon after the breaking of the bougie, because no kind of extraneous substance can remain very long in the bladder without being incrustrated by calculous matter, when, of course, if it were possible to remove the portion of bougie, that would be of no service unless the calculous matter also could be got away.

OF BRUISES OF THE BLADDER.

The mechanical injuries next in degree to those already mentioned are bruises of the bladder. The pressure of the head of the foetus during parturition is the most

frequent cause of the bladder's being bruised, but other causes may occasionally operate to produce that effect. Bruising, short of what destroys the life of the part, only excites inflammation, and when that has been produced, the treatment must be regulated by the nature of the existing inflammation, without any reference to the cause of it. The cause only deserves consideration so far as it may point out the nature and the degree of the inflammation; and, as the treatment of cystitis has already been described, it would be superfluous to say any thing upon the subject in this place. If the bruising have been so violent as to occasion sloughing, and consequent communication between the bladder and vagina, the proper treatment for those cases, it will be recollected, was mentioned when speaking of incontinence of urine.

OF PENETRATING WOUNDS OF THE BLADDER.

Wounds of the urinary bladder heal by the same process as wounds in other parts. Whenever a solution of continuity

has taken place in the animal body, it can only be repaired by the deposition of coagulating lymph, and that must result from inflammation.

Wounds of the bladder, therefore, have nothing peculiar in them, excepting what may arise from the function of that organ. It is a receptacle for the urine which distils into it constantly, and is thence expelled occasionally. When the bladder contracts, its contained fluid is necessarily driven into every opening which leads into that cavity; the admission of urine into the wound is therefore all that can be said to be peculiar to wounds of the bladder, and even that is common to wounds in any of the urinary passages.

Cuts, lacerations, or punctures of the bladder, must be succeeded by inflammation, the same as similar injuries in other parts, and consequently the treatment of them ought to be governed by similar principles.

Let it be remembered that reparation

cannot be effected without inflammation ; the duty of a surgeon, therefore, does not consist in preventing inflammation altogether, but in regulating it ; in taking care that it do not exceed the proper bounds, and also that it be of the right kind. The next thing which demands attention is to guard against the effusion of urine into the surrounding cellular membrane. A free escape for the urine must be ensured, and for this purpose it may very possibly be necessary for a catheter to be worn in the urethra till the wound in the bladder be perfectly healed, or at least till the surrounding cellular membrane has been consolidated by the deposition of coagulating lymph. The operation of lithotomy makes a wound in the bladder : I may, therefore, briefly state, that all those observations which were made relative to the treatment of patients after that operation, may be equally useful in the management of patients who have sustained accidental injuries of that organ.

Wounds of the bladder which communicate with the bag of the peritonæum

must always prove fatal ; nothing can save the patient if urine be effused into the cavity of the abdomen. On the contrary, wounds of the bladder, which do not open into the peritonæum, heal as well under proper treatment, as similar injuries in other parts.

CASE.

Several years ago I saw a man who had been discharged from the army in consequence of a wound which rendered him unfit for His Majesty's service. A musket-ball had struck him in the left groin, entered the pelvis, and passed out again at the right groin. This happened about eight years before my seeing him, and during the whole of that period he had voided his urine partly by the urethra, and partly through a fistulous sore in the right groin, and but very little came along the natural passage. No kind of instrument could be made to enter the bladder, but a bougie went so very near it as to leave no doubt of the ball having traversed the neck of the bladder, and injured the internal orifice of

the urethra. If it had been practicable to introduce a flexible gum catheter immediately after the injury was inflicted, this certainly should have been done, and the instrument have been retained there till the wounds were healed; then, most probably, the man would afterwards have suffered very little inconvenience. The patient was under the care of a very respectable surgeon at the time of my seeing him, but I cannot say how he was subsequently treated.

Were I to meet with a similar case in my own practice, I should certainly recommend the operation which has been mentioned for making a new urethra. A staff so grooved on one side, that, when introduced, the groove would answer to the left side of the urethra, should be passed as far as possible, and be retained there steadily by the hand of an assistant whilst the surgeon lays open the perinæum, and, guided by the staff, carries on the incision quite into the bladder. A flexible gum catheter should be afterwards introduced throughout the whole length of the urethra, and be kept in the

bladder till the wound in the perinæum heals. By this means a free vent would be procured for the urine, under which circumstances I apprehend the fistulous opening in the groin would close spontaneously.

A more favourable case for such an operation can hardly be imagined.

I recollect about nine years ago meeting Mr. D. a surgeon, and he gave me the following brief account of an interesting case which he had seen in consultation with his neighbour Mr. E.

CASE.

A boy ascending from a coal-pit, the rope broke, and he fell with his perinæum on one end of a piece of wood, very like a hedge stake; it was forced through the perinæum, and entered the bladder. Mr. E. attended the patient for some time, till finding that the wound in the perinæum and bladder became fistulous, and would not

heal, he requested. Mr. D. to accompany him, and give an opinion on the case. After making a careful examination, Mr. D. ascertained that a large piece of the wood had broken off, and still remained in the bladder, which being extracted, the wound soon afterwards granulated and healed.

The practical inference to be drawn from the preceding case is, that whenever the wound in the bladder is large enough to admit of a proper examination being made, the surgeon, before he attempts to close the wound, should be careful to ascertain that no extraneous substance is left in that viscus.

A friend, who resides a considerable distance off, having informed me some time ago, that he had attended a gentleman for a very serious wound of the bladder; I wrote to beg he would favour me with a full account of the case, and he has been so obliging as to send me the following, with a promise of more particulars at a future period.

CASE.

“ In January last I was requested to see a gentleman who had met with a serious accident, and I learnt from the medical gentleman in attendance, that about six weeks previously, in coming down stairs, the patient stepped upon the dust shovel and brush, which had carelessly been left by the housemaid on the landing-place, and fell from the top of the stairs to the bottom, with his legs somewhat extended; being rather a lusty man, and falling with such amazing force immediately on the top of the handle of the brush, it was driven into the body, entering very near to the verge of the anus, passed through the rectum into the bladder, and appeared only to have been prevented going directly through the body by coming in contact with the symphysis pubis. At the time I saw him, water passed by the wound behind, and fæces through the urethra; an immense discharge of pus and mucus in the water passed during the twenty-four hours. By the advice of a gentleman from London

an elastic-gum catheter had been kept in the bladder, with the hope of giving it an opportunity of healing; this had been withdrawn on the day previous to my seeing him, in consequence of its being supposed to be the cause of his great pain by the distention of the parts. At the moment I saw him his sufferings were the most dreadful to be conceived, and immediately conveyed to my mind the agonies of a man passing a calculus through the urethra. With such an impression on my mind, I told him that I thought it probable his sufferings might arise from the portion of wounded bladder having sloughed off, and "choked" up the entrance into the urethra, thus giving rise to those excruciating pains he was then labouring under; and with the hope of relieving them and relaxing the parts, I ordered a very full dose of tinct: opii: with directions to repeat it in half an hour if necessary. I had scarcely left him half an hour when his servant came, requesting me to return. I was exceedingly pleased in finding him so much relieved, and my opinion verified as to something having passed by the urethra,

which, upon examination, proved to be a part of his trowsers and drawers forced into the bladder at the time of the accident. Two or three sinuses had formed by the urine escaping into the cellular membrane; three were laid open to the bottom and soon healed. He was ordered to drink lime-water, and to take bark and soda. The discharge of pus soon lessened, but the mucus continued for some time, gradually lessening in quantity until it could not be perceived at all in the water passed during twenty-four hours. He is now perfectly well, and about two months since undertook a journey into Norfolk, without feeling the slightest inconvenience. I should have stated, that before I saw him he had suffered much at first from cystitis—afterwards from peritonitis.”

The remark on the propriety of examining the bladder, to make sure that no extraneous substance is left within its cavity, is as applicable to this last case as to the preceding one, because it shews that, although the instrument which inflicted the wound may be withdrawn in a

perfect state, it may have been the means of carrying other things before it which may be left behind.

I think there can be no doubt, that if the portion of the last patient's dress which remained in the bladder, had been discovered and taken away immediately after the accident, it would have prevented a vast deal of anxiety and suffering.

When lithotomy was under consideration, I remember saying that the success of it frequently depended more upon the previous and subsequent treatment than upon the mode of performing the operation; and I added, that this would become most evident by the observations which I should have occasion to make on injuries of the bladder.

Now we can hardly suppose it possible for any patient to sustain such a degree of mischief by the operation of lithotomy as was inflicted by accident in the two last cases; if, therefore, patients sometimes die in consequence of the lesser injury by the

operation, it must result from some cause distinct from the wound ;—it must be owing to the state of the constitution, which, fortunately for us, may be very greatly influenced by the treatment of the patient both before and after the operation.

FINIS.

